PRINTER 3c & 2c

1946

NAVY TRAINING COURSES

NAVPERS 10423

PRINTER 3c & 2c

PREPARED BY
STANDARDS AND CURRICULUM DIVISION
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PREFACE

This book has been written for the purpose of helping enlisted men to secure promotion to the ratings of Printer 3c and Printer 2c. It is one of a series of NAVY TRAINING COURSES designed to give men of the Navy the background information necessary to secure advancement in rating.

Qualifications for the rates of Printer 3c and Printer 2c are listed in the appendix at the back of this book. This training course contains information on all the technical qualifications for both rates. Because examinations for promotion are based exclusively on these qualifications, it is suggested that men refer to them frequently for guidance.

Beginning with a brief review of the history of printing and the development of the printing press, this course gives you helpful information on punctuation, the many type faces that will be used and the duties of a compositor. It continues with an explanation of imposition and lockup, maintenance and operation of the printing press, various kinds of paper and paper handling; and concludes with a chapter on mathematics for the printer.

As one of the NAVY TRAINING COURSES, this book was prepared by the Training Courses Section of the Bureau of Naval Personnel in co-operation with Naval establishments and personnel specially cognizant of the duties of a printer.

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CHAPTER 1

IMPROVEMENTS IN PRINTING

JUST IMAGINE

Suppose, when you climbed out of the sack tomorrow morning, you found that a mysterious new element had destroyed all printed matter aboard ship. Fantastic? Yes, but just look at what would happen to your life at sea without printed material.

Let's start in your navigation department. Your navigator would not have printed charts on which to plot your ship's course. He would not have reference books to tell him where you were, even after he had plotted a rough course. He would not have printed tables to show him currents and speeds and tides. In other words, you would soon be lost.

So your communications officer would start to send out messages for help. But he would have no code books to tell him what incoming messages meant. He wouldn't have the General Signal Book or the Auxiliary Signal Book to help him decode the messages that were sent to help you.

If something happened to the intricate machinery

or guns aboard ship, your engineering department would probably be able to fix it. But they could make repairs much faster if they could refer to the handy and helpful books they now have, that tell them just where and what each part of each machine is and how it operates.

Your ship's logs are printed too—without them the necessary data on your cruise would be difficult, if not impossible, to keep. Your medical department would be able to handle ordinary injuries, but they would have no medical books to consult if your injury or sickness was unusual or difficult to diagnose. Your supply department would be in a bad way too—and so would you, without your semi-monthly pay check, which is only a printed form. And at the end of a hard day, you couldn't even "curl up with a good book" because your ship's library would be empty and the magazine racks bare of reading material.

A glance around the ship will show you many other places where printed material is used—and it doesn't take long to discover that life aboard ship would be quite a lot different if there were no such thing as printing. So, you've made a good choice in deciding to be a printer. It's an important and interesting part of Navy life—just as it is an important part of life in the outside world.

HOW PRINTING GOT ITS START

The birth of printing is obscured by the passage of time. Popular credit goes to the wise and ancient Chinese who, it is claimed, produced the first printed book from BLOCKS OF CARVED WOOD. The earliest known date of publication is 868 A.D. when Wang Chieh printed a book "for free general distribution to perpetuate the memory of his parents."

Printing from solid wooden blocks was slow work and required long hours of labor by a skilled craftsman. So it was not until the invention of separate,

movable characters, which could be used again and again, that printing, as we know it, really got under way. And again it is the Chinese who deserve credit for the first printing from MOVABLE TYPE, some time between 1041 and 1049. Unfortunately, because of the thousands of characters in the Chinese alphabet, printing with movable type was not practical and did not become permanently established in China. Too

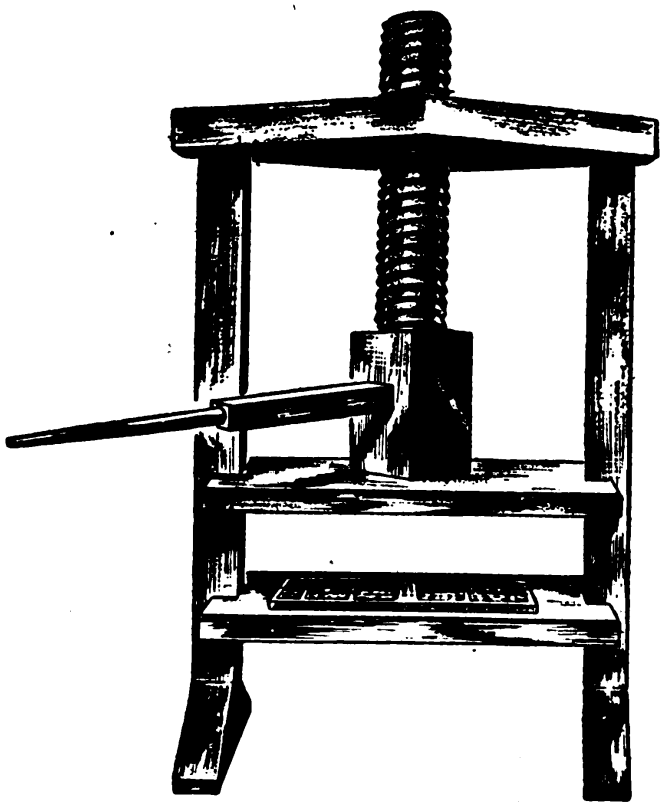


Figure 1.—The type of printing press used in Gutenberg's time.

many types were necessary, and too much time and labor were required for composition and distribution. As a result, it was several centuries later, and in Europe, that movable type really became effective in speeding the development of printing.

Printing in Europe got its start from the work of the famous JOHANN GUTENBERG. Although movable type had been used before, Gutenberg developed an adjustable mold that made production of type

quicker, easier and more practical. He also designed his own type and supervised or actually printed books as early as 1454. A few copies of Gutenberg Bibles, which he printed around 1456, are still in existence—you might even be able to buy one if you had about $250,000 to invest in it.

Soon the art of printing spread throughout Europe. Italy was probably the second European country to benefit from the printed word. And, strangely enough, one of the best known early day printers in Italy was a Frenchman, NICHOLAS JENSON, who worked in

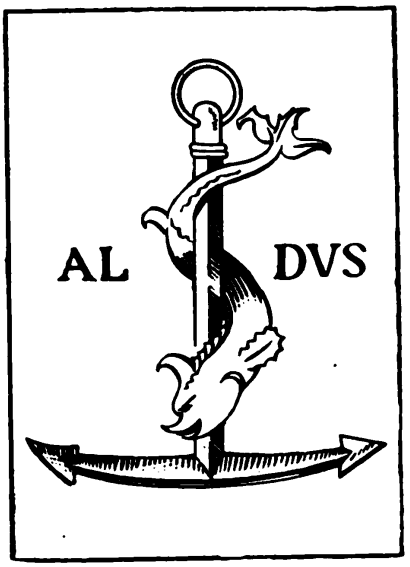


Figure 2.—The mark used in works printed by Aldus Manutius.

Venice around 1470. Jenson added LOWER CASE letters to the Roman capitals. And the type he created has made his name familiar even in our time.

Another Venetian printer was ALDUS MANUTIUS, who originated Italic lower case letters as his contribution to fame in the printing world. Aldus was probably one of the first men to foster the spread of knowledge by making the classics available in small, inexpensive volumes.

Across the channel, England soon heard of the new art. WILLIAM CAXTON, who learned printing in the Low Countries, returned to England in 1476 and set

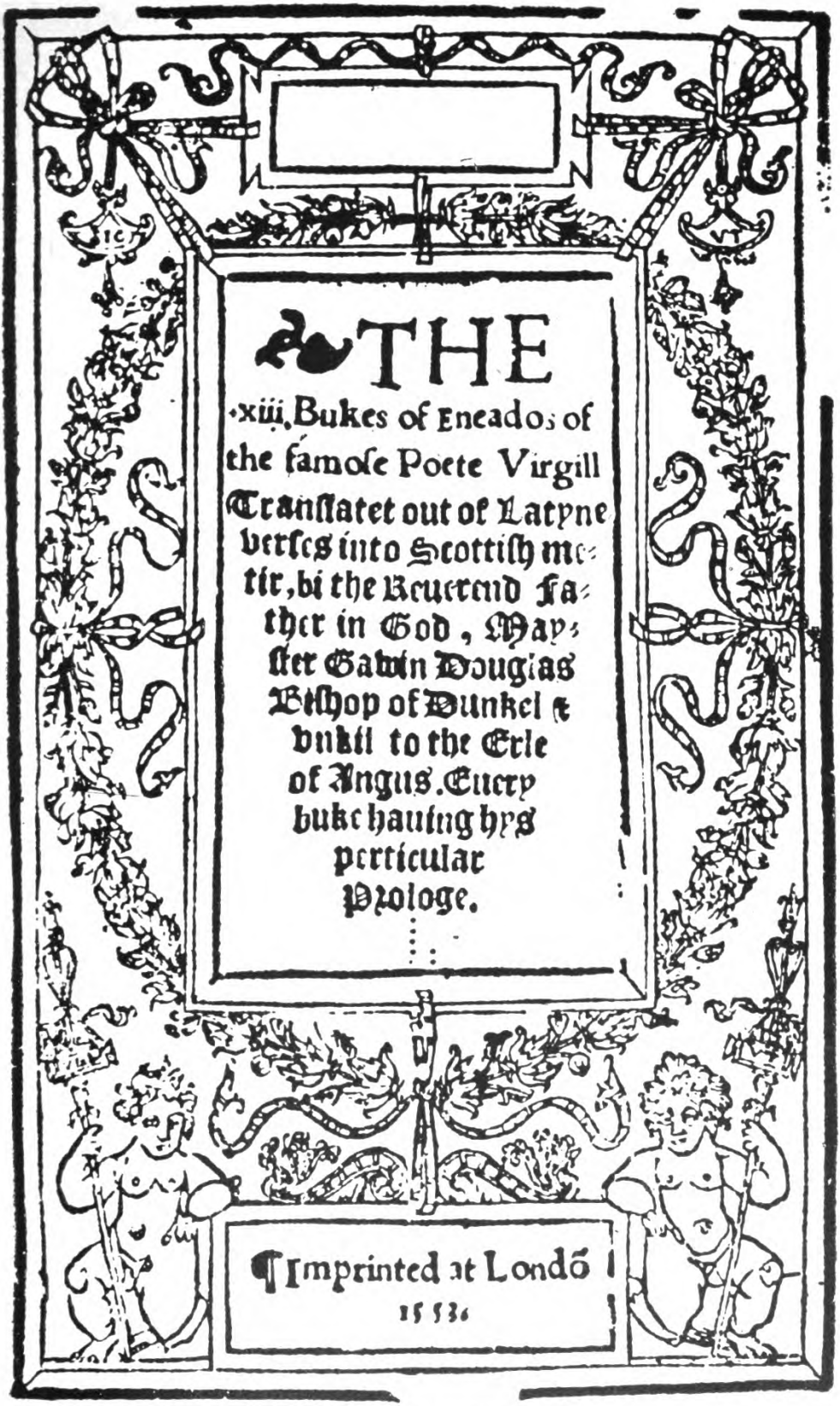

THE
·xiij. Bukes of Eneados of
the famose Poete Virgill
Translatet out of Latyne
verses into Scottish me-
tir, bi the Reuerend Fa-
ther in God, May-
ster Gawin Douglas
Bishop of Dunkel &
vnkil to the Erle
of Angus. Euery
buke hauing hys
perticular
Prologe.
¶ Imprinted at Londō
1553

Figure 3.—A page from a book printed in England in 1553.

up a shop in Westminster. His first production, a papal indulgence, appeared in December of that year. Caxton added something new to printing. Unlike the Europeans who printed only in Latin, Caxton was the FIRST MAN TO PRINT BOOKS IN HIS NATIVE LANGUAGE.

Look down the list of famous type faces and you'll find perpetuated the names of many men who gave much to the early development of printing. William CASLON, one of the great names in English printing, flourished in the early eighteenth century. John BASKERVILLE was another famous English printer who exercised a profound influence on the trade. Claude GARAMOND was a French printer whose type designs are known for their grace and beauty. Giambattista BODONI, who created the famous type family of that name, was for half a century one of the great names in Italian printing.

EARLY PRINTING IN AMERICA

The year 1539—almost 100 years before the Pilgrims landed at Plymouth Rock—marks the date of the first printing in America. In that year GIOVANNI PAOLI, acting under orders from the Archbishop of Seville, brought printing equipment from Spain to Mexico City and set up a print shop there. Probably the first works to come from this press consisted of primers for the education of children, but none of these has been preserved. Several of his books published within the next few years are still in existence, however, and show us the type of printing first done on this continent.

The earliest printing in the English language in this hemisphere didn't take place until almost a century later. The Reverend JOSE GLOVER, a clergyman of Sutton, England, set sail for the Massachusetts Bay Colony in 1638. He brought with him complete printing equipment, including a press, type, paper, ink and other accessories. And he also contracted for

the services of STEPHEN DAYE, Daye's two sons, and another workman to do the printing.

On the trip over, the Reverend Mr. Glover died, but the work he started was carried on by Mrs. Glover and the Daye family. Their first work was, symbolically, the "FREEMAN'S OATH." The first BOOK from this press—of which there are still copies in existence

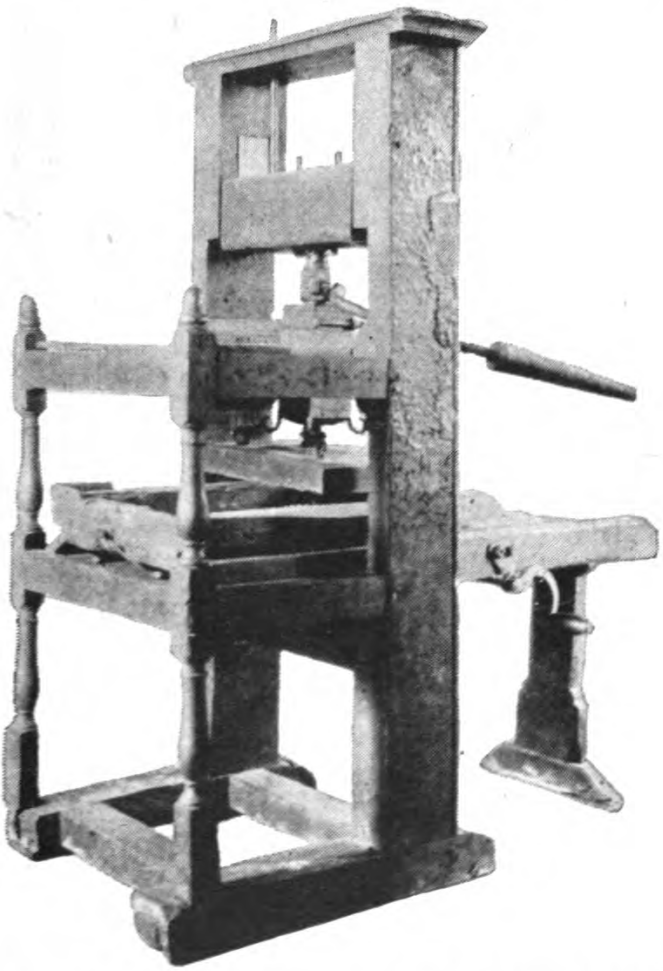


Figure 4.—The type of press used by Benjamin Franklin.

—was "THE BAY PSALM BOOK," printed in 1640. If you ever run across a copy in your attic, handle it carefully because you will have a good-sized fortune in your hands.

The art of printing developed slowly in the New World. It was not until 1704 that there appeared the first officially licensed newspaper—"The Boston

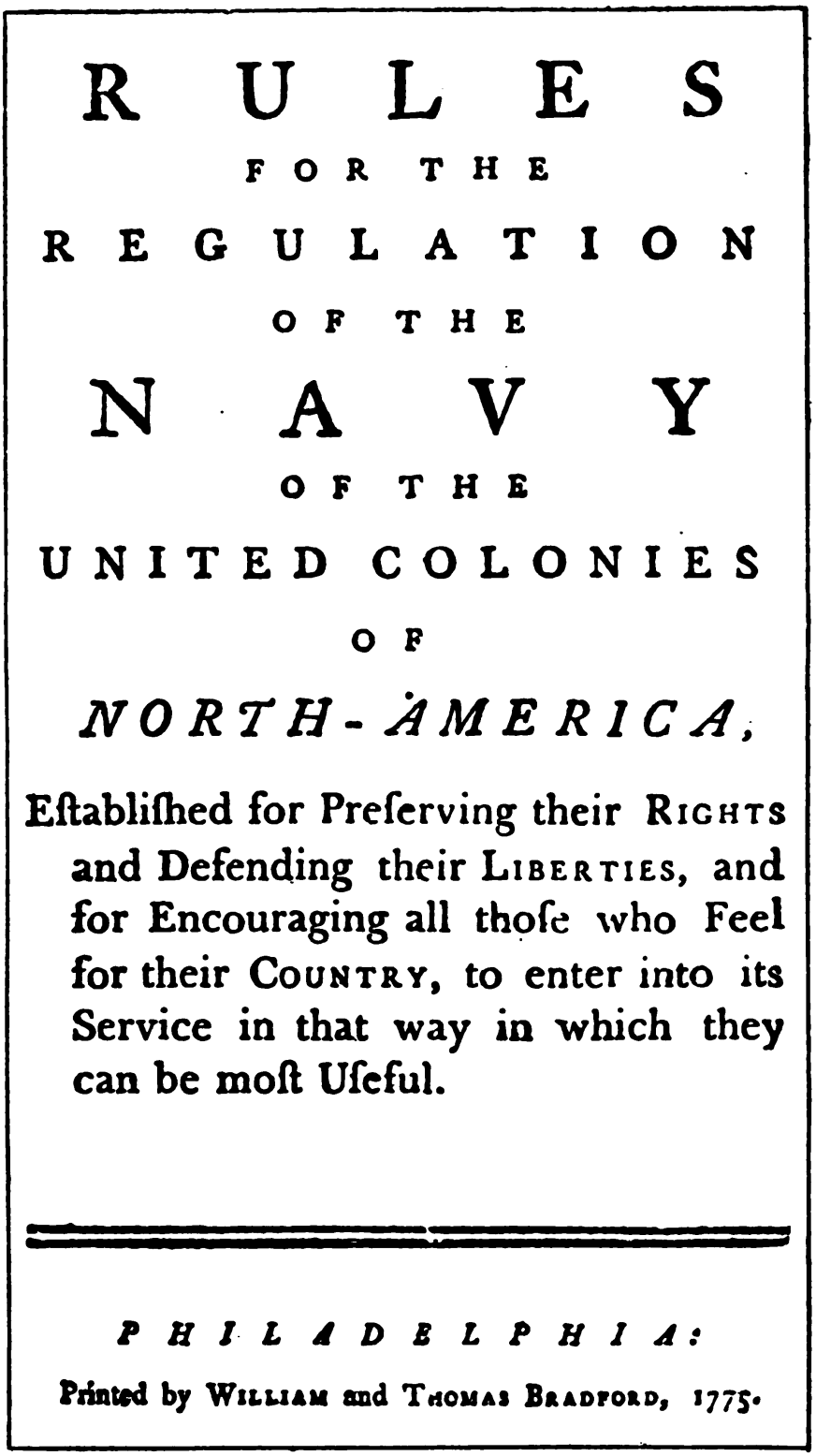
Newsletter." But this was soon followed by "The Boston Gazette" in 1719, "The American Weekly Mercury," published in Philadelphia in the same year, and "The New England Courant" and "New York Gazette," published a few years later.

And now there appears on the scene one of the great figures in American printing. BENJAMIN FRANKLIN, who learned the trade as an apprentice to his brother, James, in Boston, set up a print shop of his own in Philadelphia in 1728. A year later he started "The Pennsylvania Gazette," which eventually became "The Saturday Evening Post," and in 1732 he published the famous "POOR RICHARD'S ALMANAC." He retired from the printing field in 1748 to become one of the leading statesmen of Revolutionary times. His autobiography is of particular interest to printers because in it Franklin tells of his experience in the early days of American printing.

THE PRINTING PRESS AND HOW IT GREW

During the early years, printers worked with wood hand presses operated on the SCREW PRINCIPLE. The first radical improvement in this type of press came toward the close of the eighteenth century when Adam Ramage of Philadelphia and the Earl of Stanhope in England developed presses made of iron. Soon afterward the screw principle was abandoned and presses which used LEVERS made their appearance. And around 1811, a POWER-DRIVEN press was put on the market. Three years later "The London Times" installed two "CYLINDER PRESSES," which were flat-bed machines with continually revolving cylinders. The issue of November 29, 1814, proudly states that it was "printed by steam power."

However, the printing press was still a long way from its present day successor in both speed and technique. One of the greatest steps toward that goal was the HOE-TYPE REVOLVING MACHINE, invented in 1846



RULES
FOR THE
REGULATION
OF THE
NAVY
OF THE
UNITED COLONIES
OF
NORTH-AMERICA,

Eſtabliſhed for Preſerving their RIGHTS and Defending their LIBERTIES, and for Encouraging all thoſe who Feel for their COUNTRY, to enter into its Service in that way in which they can be moſt Uſeful.

PHILADELPHIA:
Printed by WILLIAM and THOMAS BRADFORD, 1775.

Figure 5.—Title page from the predecessor of Navy "Regs." Printed in 1775.

by Robert Hoe, an American. In the Hoe press, the type cylinder was placed in a horizontal position and the type locked in cast-iron chases. Each chase represented one page of a newspaper and by using this press it was possible to turn out 2,000 sheets per feeder per hour.

The forerunner of the light platen press, called the "FRANKLIN PRESS," was invented by George P. Gordon in 1856; and for a number of years this press was widely used throughout the world. But then came halftone and color printing—so, to take care of these requirements, Merritt Gally, in 1869, invented what was called the "UNIVERSAL" press. This involved a new type of platen and was the pattern for heavy platen machines used for color printing.

In almost every printing office, you'll find a "MIEHLE" press. This press was a development of Robert Miehle in the latter part of the nineteenth century and was first used in 1888. "Miehles" are used for every class of work—and are known as one-color, two-color, and perfecting machines.

TYPES OF PRINTING

All of these early presses were based on the same general principle—that is, raised type comes in contact with an inking device and then stamps its impression on a piece of paper. This type of printing is known as RELIEF or LETTERPRESS printing. In printing this page, for example, the letters which appear here were produced by type which was coated with ink and then impressed on the sheet. The spaces between the raised type received no ink and, as a result, made no impression on the paper. Hence the white areas on the page.

Another type of printing—an up-and-coming youngster in the typographic arts field—is PLANOGRAPHIC PRINTING. Here the characters or designs are at the same height as the blank spaces between and

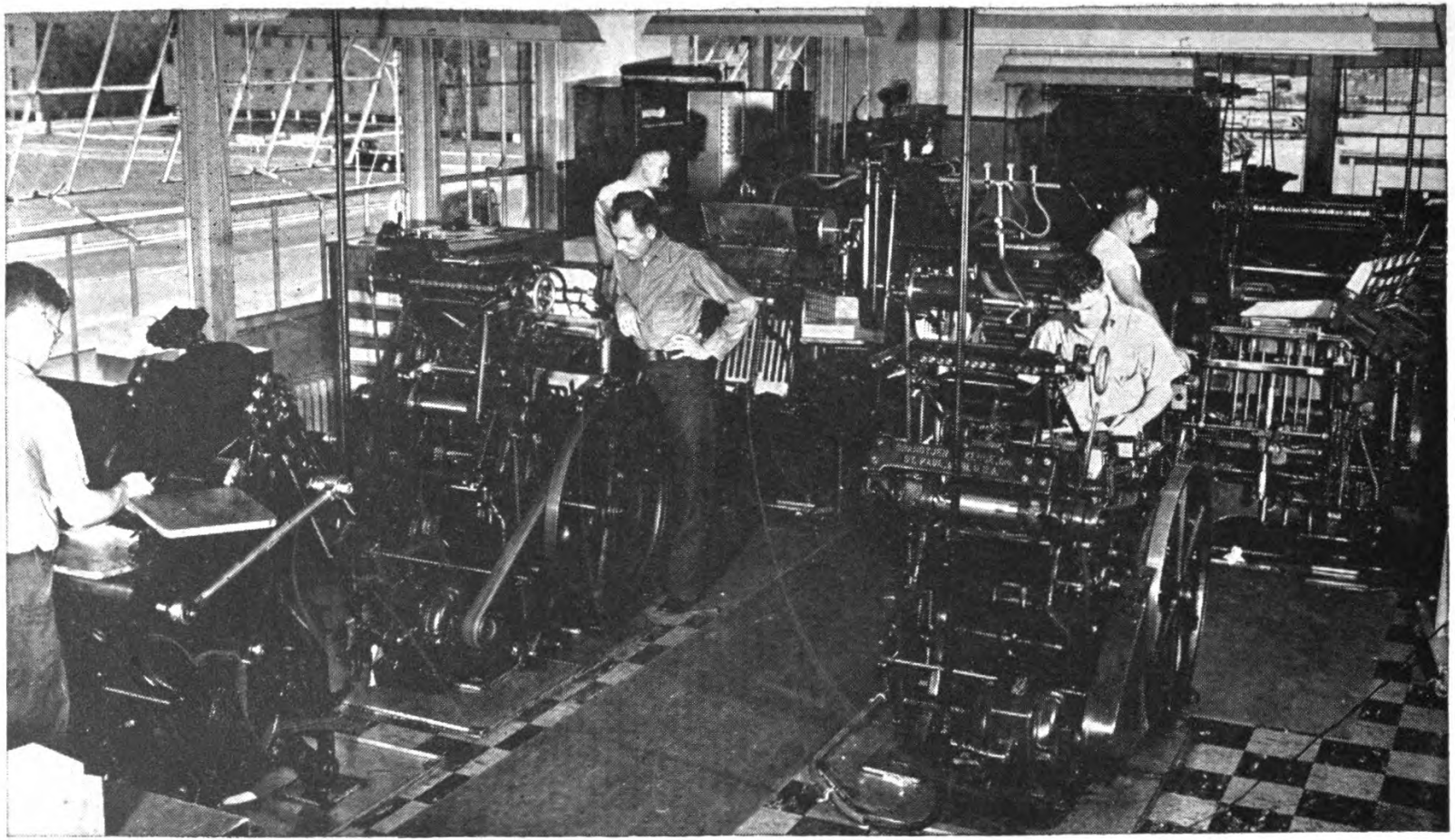


Figure 6.—Section of a Navy print shop at a shore base.

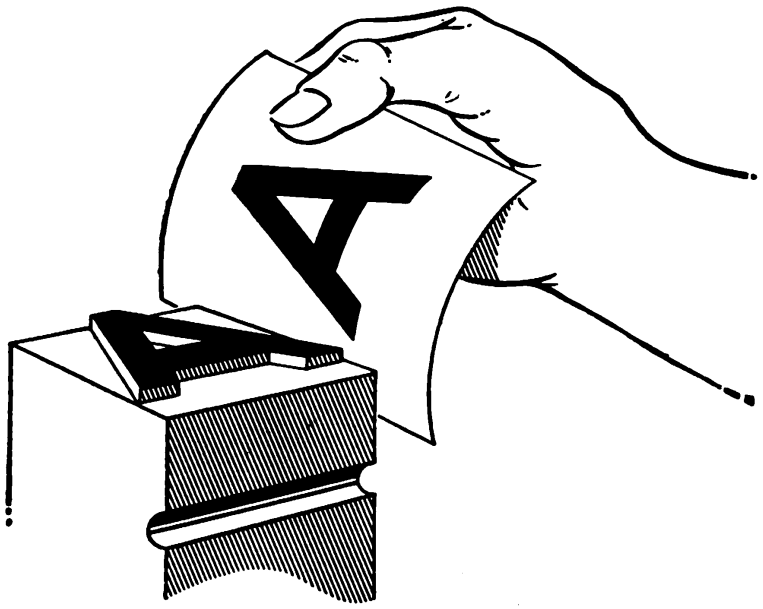


Figure 7.—The principle involved in letterpress printing.

around the type. Then how does it work? The blank areas—that form the white spaces on a page like this—are treated so they will repel the ink. As a result, only the type (or illustration) will take the ink and transfer it to the page. OFFSET PRINTING, LITHOGRAPHY,

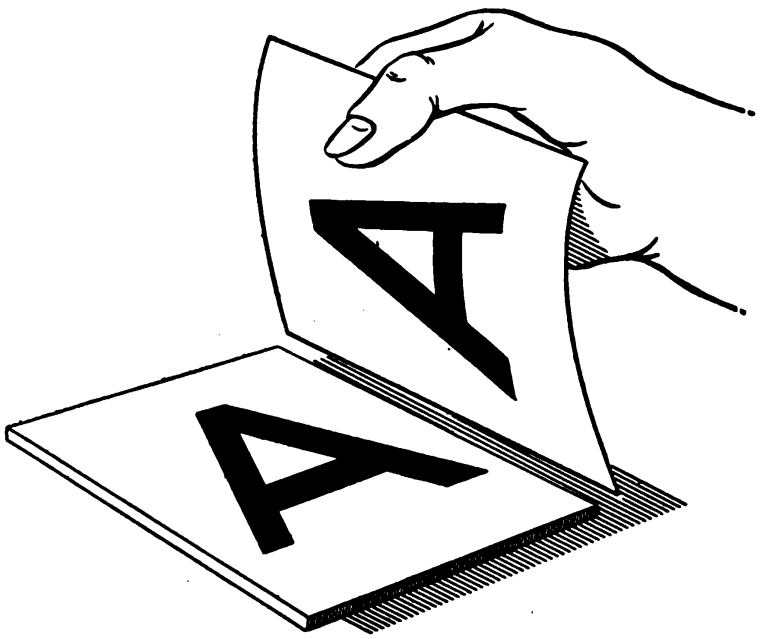


Figure 8.—The principle involved in planographic printing.

and PHOTO-GELATIN printing are all branches of planographic printing.

The exact opposite of the letterpress method is INTAGLIO PRINTING. In this process, the design or characters to be printed are cut, or etched, below the blank areas. Then the etched areas—those that are cut below the surface—are filled with ink and the blank areas are wiped clean. As a result, only the areas filled with ink will reproduce on the paper stock. The ROTOGRAVURE section of your Sunday newspaper

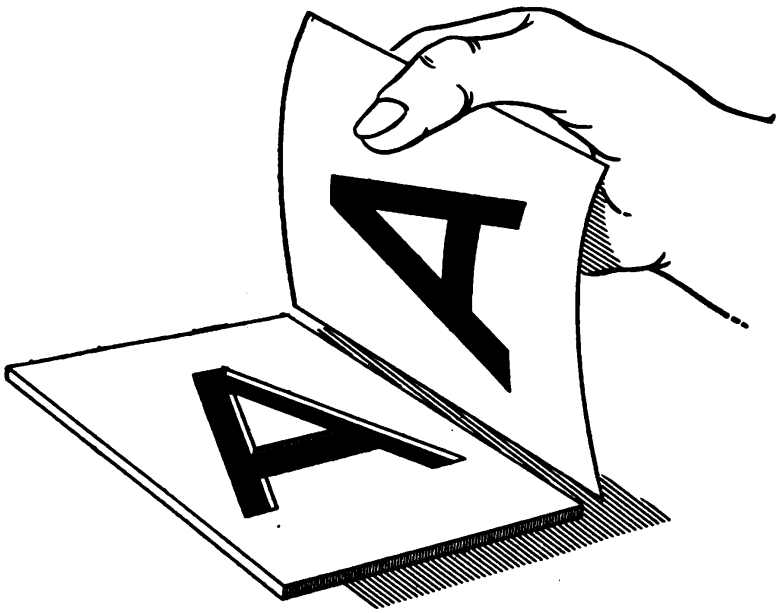


Figure 9.—The principle involved in intaglio printing.

is the most common example of this method, but STEEL DIE and COPPER-PLATE printing are also forms of intaglio (pronounced IN-TAHL-YO).

JOBS IN THE PRINT SHOP

Here we're going to deal only with relief or letterpress printing. Planographic printing has its own special ratings in the Navy—either Printer L (Lithography) or Printer M (Offset). And not enough intaglio printing is done in the Navy to warrant a detailed description of it.

You will be called on to do many jobs on your ship or at your shore print shop. But, basically, there are just four main divisions to any printing department.

First of all, there is the COMPOSING ROOM. Here the main job is to choose the kind of type that will be used, and to set it—either by hand or by machine.

The next step belongs to the STONEMAN. He takes the type from the composing room, puts it in a frame, called a chase, and locks it up in a permanent form so that it is ready for the press.

Then comes the actual PRINTING OF THE JOB. Automatic and hand-fed JOB PRESSES are the ones you will probably be called on to run, so you will find a chapter devoted to the operation of these presses.

After the job comes from the press, it goes to the BINDERY. Here it is cut, assembled, folded, bound, stapled, stitched or punched, according to the nature of the job.

In large printing houses there are specialists in each of these fields and they are required to do only one type of job at any time. But if you're really going to KNOW printing, you must be familiar with ALL PHASES OF PRINTING. Besides, in your Naval career you will probably be called on to do almost all of the jobs described in this book. So you will find it useful —and interesting—to study all parts of the printing field as thoroughly as you can.

CHAPTER 2

PUNCTUATION FOR PRINTERS

IT AVOIDS MISTAKES

Before the birth of printing, punctuation was a lot simpler but not nearly as efficient as it is now. The only punctuation in most old, hand-illuminated manuscripts was an oblique line between words. It could represent a long break or a short break or a question—or just a slip of the pen.

Aldus Manutius, the sixteenth-century Venetian printer, is credited with the development of our modern punctuation system. He gave a better shape to the comma, added the semicolon, and determined the proper emphasis for comma, semicolon, colon, and period. The question mark and exclamation point were not added until several years later.

Actually, PUNCTUATION ON A PRINTED PAGE CORRESPONDS TO THE PAUSES AND INFLECTION OF THE SPOKEN WORD. When you read or speak, your voice helps convey the meaning by pausing in the correct places and by rising or falling to give the proper emphasis.

Commas, periods, exclamation points, and other forms of punctuation help give this emphasis to printed messages and help convey the correct meaning of what is written.

There are all sorts of stories about what has happened as a result of incorrect punctuation. Maybe you've heard of the woman whose husband—a Navy lieutenant—had just gone to sea. She thought some prayers might help him and handed this note to her pastor one Sunday morning: "Lieutenant Joe Jackson, having gone to sea, his wife requests the prayers of the congregation for his safety." But the near-sighted pastor, failing to notice the commas, read it, "Lieutenant Joe Jackson, having gone to see his wife, requests the prayers of the congregation for his safety."

$2,000,000 COMMA

THAT mistake was embarrassing to Mrs. Jackson but otherwise harmless. However, a story is also told of how a change of a HYPHEN to a COMMA cost the United States Government more than $2,000,000. It is said that some years ago a tariff bill specified that among certain articles to be admitted duty-free were "all foreign fruit-plants"—meaning fruit-plants admitted for experimentation, propagation, etc. The clerk who copied the bill made it read, "all foreign fruit, plants," and until the error was corrected by another Act of Congress about a year later, all foreign-grown fruits, such as oranges, lemons, bananas, and grapes, were admitted free of duty.

Any errors you might make probably wouldn't be so serious as that, but the story does help illustrate the importance of punctuation. And correct punctuation is especially important to you as a printer, because it costs money, time, and good will to make type changes because of errors in punctuation. So familiarize yourself with the common uses of punctuation marks.

THE PERIOD

To indicate a complete stop, use a PERIOD (.). It is used after sentences that contain a command or make a simple statement of fact, as, "There is valuable information on every page of this book." And it is also used after abbreviations, as in "Lt. J. J. Wickham." A period is also used to point off decimals, as, "The height of type is .918 of an inch."

THE COMMA

One of the most frequently misused marks of punctuation is the COMMA (,). Its usage varies widely and in many cases seems to depend upon the writer's whims. However, the following rules are basic, and you may depend on them to provide a general framework of the proper procedure.

The comma represents a minor break in thought and is used to set off items in sequence. Some of the specific uses of the comma are: to separate groups or words or figures that might be misunderstood, as in "Typesetting, proofreading, and press operation are all requirements of a good printer."; after "Yes" or "No" when they are part of an answer, as "Yes, I have written to him."; and to separate parts of addresses or dates as "W. J. Walker, Pleasant Street, Brookfield, Mass." or "November 22, 1912."

The comma is also used to separate the figures of integral numbers having more than three digits, as, "There were 476,092 votes cast"; to indicate the omission of a word, as "To err is human; to forgive, divine."; to separate parts of a compound or complex sentence which contains two or more separate thoughts, as "This book is to be studied, not read hurriedly."; and to set off the name or title of an individual to whom you are speaking, as, "Sir, this book is for you."

THE QUESTION MARK

As you know, the QUESTION MARK (?) is used to indicate questions requiring an answer, as in that classic question, "Haven't I seen you somewhere before?" It is also used to express doubt, as in this sentence, "The first printer in Massachusetts was Stephen Day (Daye?).

THE EXCLAMATION POINT

To express wonder, astonishment, command, or strong feeling an EXCLAMATION POINT (!) is used after a word, phrase, or sentence. Thus, "What a wonderful day!" It is also generally used after a purely exclamatory sentence beginning with "O," as "O Lord, save us lest we perish!"

THE SEMICOLON

The SEMICOLON (;) is used to separate phrases containing commas, as in this sentence, "Benjamin Franklin was one of the most famous early American printers; but he was statesman, author, scientist, and inventor as well." It is also used to separate phrases that are too closely related in meaning to be written as separate sentences, as, "Every printed piece should have a personality of its own; it should be more than just a page of black type." In other words, the semicolon represents a break greater than a comma, but less than a colon.

THE COLON

Representing a break less than that indicated by a period, but more than that indicated by a semicolon, is the COLON (:). It is used for formally separating an introductory or opening statement from the matter that follows, as in the well-known introduction to an after-dinner speech, "Mr. Chairman, Ladies and Gentlemen:" It is also used after the salutation of

a letter, "Dear Sir:"; and between figures representing hours and minutes, or indicating proportions, as, "Hours are 8:00 A.M. to 4:30 P.M." and "2:4 = 6:12."

QUOTATION MARKS

The chief purpose of QUOTATION MARKS (" ") is to distinguish the text of the author from that of another writer or speaker. Present practice is to avoid too frequent use of quotation marks.

There are two types of quotation marks, DOUBLE (" ") and SINGLE (' '). Direct quotations should be enclosed in double quotation marks, as for example, "Every man shall have the right to life, liberty, and the pursuit of happiness." A quotation that is included IN another quotation is enclosed in single quotation marks, as in this sentence, "The 'rights' of man, as distinguished from his 'duties' are not under discussion."

When a quotation includes several paragraphs, quotation marks are placed at the beginning of each paragraph, but at the end of only the last paragraph —NOT at the end of each preceding paragraph. When one quotation extends through several sentences in the same paragraph, quotation marks are used only at the beginning and end of the quotation.

Titles of pictures, books, songs, etc., are usually put in quotation marks, unless they are in italics, as in this sentence, He was reading "The Care and Feeding of Goldfish." Any technical, unusual, or ironical words, and words or phrases which are accompanied by a definition, may also be set in quotation marks, as, A "reglet" is a narrow strip of wood used to lock up or space out a type form.

PARENTHESES

Parentheses ( ) are used to set off matter which is not part of the main idea, but is important enough to be included, as in "Bodoni is one of the most fre-

quently used type faces (see p. 46)." They are also used to enclose an explanatory word which is not part of the statement, as in "The Duluth (Minn.) News-Tribune," or to set off figures or letters used to mark divisions in running text, as, "The divisions of a print shop are: (1) Composing Room, (2) Pressroom, (3) Bindery."

BRACKETS

Another method of enclosing an explanation or note is to use BRACKETS [ ]. Thus, in the following sentence, the name in brackets explains the indefinite pronoun: "Then he [Bodoni] created a new type face." Brackets are also used to indicate an addition by the editor, as "The date of the first printed book is uncertain [around 1454, Editor]"; or to correct a mistake or supply an omission, as "Johann Gutenberg is called the father of [European] printing."

THE DASH

In general, the DASH (—) is used to mark a sharp break in thought WITHIN a sentence. There are three types of dashes which are in most frequent use—the em dash, the two-em dash and the en dash.

The em dash is used to indicate pauses and repetitions which are intended for rhetorical effect, as "Can we—dare we—stop now?"; to indicate a sudden change of thought, as "If we add proofreading—but we shall come to that later."

The em dash is also used instead of a comma to set off more definitely some part of a sentence, as in the following: "If we add typesetting—and that is one of your most important duties—we will have the full story."; or to indicate an abrupt break in conversation as, "Now is the time for all good men to come to t—"; and also with a credit line or reference, such as "Note—the above is taken from Navy Regulations."

The two-em dash is used to tie an introductory

phrase to related lines that follow, as "We recommend— (1) Thorough study, (2) Actual practice."; after a date to indicate that time is still continuing, as "1776—," or to indicate missing letters, words or figures, as "Ray—d" [Raymond].

The en dash is used instead of a hyphen in connected combinations of figures or letters (as, for example, the "B–25"), or to indicate the omission of the word "to" in short combinations of words or letters indicating time, as "1944–45."

THE HYPHEN

The line which joins the parts of a compound word, such as "so-called" is known as a HYPHEN (-). It is also used to join a prefix ending in a vowel with a word beginning with the same vowel, as "re-enter" and to separate the letters of a word divided into syllables or one spelled out, as "P-r-i-n-t-e-r."

THE ELLIPSIS

To indicate the omission of part of a quotation you should use a series of four periods separated by en quads. This is called an ELLIPSIS (. . . .) and is used in the following example: "The Declaration of Independence guarantees 'life, liberty . . . . happiness.'"

THE APOSTROPHE

The most common use of the APOSTROPHE (') is to indicate possession, as, "Shakespeare's 'Hamlet'"; but it is also used to mark the omission of a letter in the contraction of a word or of figures in a number—as, for example, "It's not easy to become a good printer," or "The Spirit of '76."

NUMERALS

Numbers should be spelled out when they are used at the beginning of a sentence, such as, "Twelve sea-

men reported for duty"; when they refer to dignified subjects as, "The Thirteen Original Colonies"; or when they refer to an indefinite period, such as, "The early seventies."

Ordinariiy, in text matter, you should spell out every number of less than two digits, such as "There are seven cities in this classification"; and also spell out round numbers, as, "The attendance was estimated at two thousand"; and numbers that refer to the time of day (when they appear in running copy), as, "The game started at three o'clock."

Figures SHOULD be used for dates (1945); page numbers (p. 240); dimensions (1¼"); degrees (72°); distances (6 miles); weights (50 pounds); measures (100 bushels); sums of money ($7,456.00); decimals (3.1416); and percentages (10%).

CAPITALIZATION

One of the most common sources of error in the printing field is in the use of CAPITAL LETTERS. Usage varies considerably even though there are standard rules to be followed in almost every case.

In general, there are two schools of thought—one which favors the liberal use of capital letters and would use, for example, two capitals in "Atlantic Ocean" and the other which favors the limited use of capitals and would set it "Atlantic ocean." The first is called the UP STYLE and the second, DOWN STYLE. But even though there are some variances, you will find the following rules helpful as a guide to supplement whatever style book is used in your printing office.

Naturally, the first word in a sentence is capitalized; also addresses, salutations, and signatures. Interjections, such as "O," are always capitalized, as are the names of historic papers and documents such as the Constitution.

In addition you should always capitalize proper names; the names of organized bodies, such as, "Tam-

many Hall," the names of countries, domains, and administrative bodies, as, "The United Kingdom," and the "Third Congressional District"; the names of regions, localities, and geographic features, as, "The Badger State" and "Mare Island"; the names of calendar divisions, as "May 30th"; religious names denoting the Deity, the Bible, sacred writings and religious sects and bodies, as the "Sacred Scriptures" and "The Roman Catholic Church"; and trade names, such as "Firestone" tires or "Dennison" tags.

Titles of persons, such as "King George"; and titles of publications, papers, documents, acts and laws, such as "The Epic of America" and the "Prohibition Act," are also capitalized. Words to be emphasized may, under certain conditions, also be capitalized, as "Their slogan was, 'They Shall Not Pass'."

DIVISION OF WORDS

It is always preferable not to divide words at the end of a line, but there are times when division is necessary in order to secure good spacing.

The first rule of good division is to divide according to pronunciation, as "democ-racy." Words of one syllable, such as "then" and "walked" should never be divided; and some words, though not monosyllables, are never divided because they would become confusing to the reader. Such words are "often" and "water."

Divide immediately after a vowel if possible, as "comi-cal" or "sepa-rate," except when the words end in "able" or "ible." In such cases the division comes before the vowel, as in "read-able" or "convert-ible."

Divide between two consonants when they stand between vowels, if possible. For example, "advantage," "profes-sor." In present participles, carry over the "ing," as in "learn-ing" or "giv-ing," except when the ending consonant is doubled before the addition of "ing."

This last rule does not apply, however, to words in which the root itself ends in a double consonant, as "passing," which is divided "pass-ing"—and NOT "pas-sing."

When the final consonant sounds of the root word belong to a syllable ending in a silent vowel, the consonant becomes part of the syllable with "ing," as "hus-tling," or "ram-bling."

Always avoid breaking words that are already hyphenated, unless you can divide them at the hyphen. Thus, "poverty-stricken," not "pov-erty-stricken." And try also to avoid having more than two lines in succession ending in hyphens. Never divide proper names, or separate the initials of a proper name from the name itself. For example, "B. B. Brown" should not be set with "B. B." on one line and "Brown" on the next—much less with "B." on one line and "B. Brown" on the next. Finally, the last word on a page or the last word in a paragraph should never be divided.

You may find it necessary to sacrifice some of the above rules on occasion, but you will always find that it is preferable to sacrifice spacing, within reasonable limits, rather than to violate these rules. The basic rule is to use your own judgment, based on a knowledge of these suggestions, in dividing words.

CHAPTER 3

MEET THE TYPE FAMILIES

RESEMBLANCES AND DIFFERENCES

Ever notice how the different members of a family usually have some kind of a basic resemblance? You call it a "family resemblance." Well, there are FAMILIES IN TYPE too—they have the same family name and a basic resemblance just as your own family has, yet the members differ from each other just as you differ from your own brothers and sisters.

For example, there are several members of the CASLON TYPE FAMILY. They all bear the name of Caslon and they all look somewhat alike, but differ slightly in appearance. There are Caslon Antique, Caslon Oldstyle, Caslon Italic, Caslon Bold and many others—all unmistakably Caslon, but all different in some way.

There are six main CLASSES of type—ROMAN, ITALIC, SANS-SERIF, TEXT, SCRIPT, and CONTEMPORARY. Each of these classes differs widely from the other.

How do types differ? In spite of the fact that the ordinary reader does not notice the type he is reading,

there are actually great differences. And you, as a printer, should study them carefully so you can spot the various kinds at any time.

Perhaps the best way to point out differences in type is to look at actual examples. Figure 10 illustrates two capital letters—the one at the left is

Figure 10.—A Caslon E compared to a Futura E.

CASLON, which is a ROMAN type; the other is FUTURA, which is a SANS-SERIF face.

You notice the difference right away when you see them side by side. The Caslon E is more graceful, is made up of both heavy and thin lines, and the letter itself has sort of an easy, curved effect which is aided by the use of the SERIFS—or cross strokes at the ends of the main strokes. The Futura E, on the other hand, is absolutely plain and straight with all lines being of equal strength. It has no serifs and gives the impression of being angular, yet not unattractive.

Both of these type faces are popular and used frequently. They are both good types to use, depending on the kind of material you wish to set. And they will give you an idea of the possibilities of using different kinds of type on different jobs.

ROMAN TYPES

The most widely used class of type today is ROMAN. Most newspapers, magazines, and books use one of

the ROMAN types—THE BODY TEXT IN THIS BOOK, for example, IS SET IN 12 POINT MODERN NO. 21, a Roman type. Roman letters are considered the easiest to read in smaller sizes and when used in lengthy articles. Like your blues, they "wear well."

Roman letters are so called because the inspiration for their design was the alphabet used by the ancient Romans. Their alphabet consisted of capitals only and provided the basis for most of the alphabets now used in the Western world. NICHOLAS JENSON, the early Venetian printer, was the first to design a type in the style of Roman letters. Before this time, letters were similar to those we call "Text" and were an imitation of the handwriting prevalent from the fourth to the ninth century.

OLDSTYLE ROMAN

Roman type is further divided into OLDSTYLE and MODERN. Both types possess the essential characteristics of Roman, but Oldstyle is somewhat softer and its strokes are more nearly uniform than Modern.

Does the name "Oldstyle" mean that this type isn't used any more? On the contrary, it is still one of the most widely used types in the world. But the origin of the names "Oldstyle" and "Modern" is a little confusing. Here's the story.

When Giambattista Bodoni created a new style of type in 1783, it was so different from any that had preceded it that printers started to call it "Modern," and that immediately classified all the previous types as "Oldstyle." And ever since, when type designers have cut new faces which resembled either of these two classes, they have been labeled with the same tags. So we have the unusual case of a "Modern" type which was first used over 160 years ago. And we also have such things as NEW "Oldstyle" type faces. It just goes to show that time is RELATIVE in an art as old as printing.

Oldstyle Roman types are used to create a friendly impression. They are softer looking than most types, and are usually set solid to give the page a pleasing, greyish tone. Whenever possible, it is a good idea to use a paper without a glossy finish when printing with Oldstyle types, because this helps to bring out the softness and roundness of the letters.

Among the most popular of the Oldstyle type faces is CLOISTER OLDSTYLE. This face most closely resembles that first cast by Jenson in 1470 and is considered one of the most graceful and beautiful of all types. Figure 11 features the upper case alphabet of Cloister Oldstyle to show you what it looks like.

ABCDEFGHIJKLMNOPQRSTUVWXYZ 1234567890

Figure 11.—12 point Cloister Oldstyle with old style figures.

Another is CASLON OLDSTYLE, the face originally designed by William Caslon in 1722. Caslon's type face was modeled on Jenson's but Caslon also made effective use of other designs in creating his type. Caslon Oldstyle is a distinctive and legible type face which is popular with printers everywhere. It was widely used in the United States during the Colonial Period—the Declaration of Independence was set in this type—and it is still a great favorite. Figure 12 is a line of Caslon Oldstyle.

ABCDEFGHIJKLMNOPQRSTUVWXYZ
1234567890

Figure 12.—12 point Caslon Oldstyle with new style figures.

One of the early Oldstyle type faces based on Jenson's original design is GARAMOND. It was cut by Claude Garamond, the famous engraver and printer, between 1530 and 1540. Garamond is a clean and open type, easy to read and good to look at, as you will see from the example in figure 13.

ABCDEFGHIJKLMNOPQRSTUVWXYZ 1234567890

Figure 13.—12 point Garamond.

Other Oldstyle type faces which you will meet in print shops are BOOKMAN, CENTURY OLDSTYLE, CHELTENHAM, NICHOLAS COCHIN, COOPER BLACK, GOUDY OLDSTYLE and KENNERLY.

MODERN ROMAN

The chief difference between Oldstyle and Modern Roman is in the serifs. In ROMAN the serifs are STRAIGHT; in OLDSTYLE they are ROUNDED. Modern Roman stems from BODONI's design of a type face in 1783, in which he broke away from the flowing lines of Oldstyle and originated a type that looks almost as if it were steelcut by an engraver. So Modern isn't exactly "modern" anymore, but it is still up-to-date and usable, even though the first Modern type was designed more than 160 years ago.

Modern Roman has heavier shading than Oldstyle and it also has straight, thin serifs. The strokes of the letters are almost entirely vertical, suggesting strength and boldness. Modern Roman types should always be used on a high-finished, glossy stock to add to their brilliance and sparkle—never on a soft stock such as is used for Oldstyle. And, as Bodoni himself did, modern printers use very deep leading when setting Modern—usually about one third the body size of the type.

BODONI, the type designed by Giambattista Bodoni in 1783, is the most frequently used example of Modern Roman. Bodoni is a sharp clean-cut face, clear and easy to read; it is often used when an especially legible typographic job is desired. Compare the

ABCDEFGHIJKLMNOPQRSTUVWXYZ 1234567890

Figure 14.—12 point Bodoni.

example of Bodoni in figure 14 with the examples of Oldstyle shown previously.

Other Modern Roman faces with which you will become familiar are BERNHARD ROMAN, CENTURY, and GOUDY MODERN. BASKERVILLE and SCOTCH ROMAN, which contain some elements of both Oldstyle and Modern, are sometimes called TRANSITIONAL FACES, but are usually classed with Modern.

HOW TO TELL OLDSTYLE FROM MODERN

You'll find the study of type faces interesting and profitable. Make a game out of going through maga-

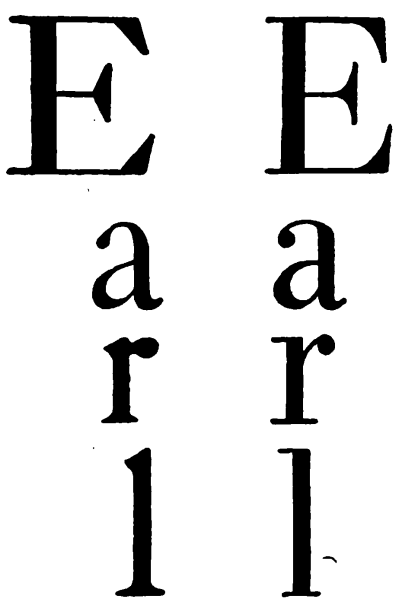


Figure 15.—Comparison between Caslon Oldstyle (left) and Bodoni Modern.

zines to see how many you can spot. Pretty soon you'll find that certain type faces are as familiar to you as old friends.

Usually the capital E and the lower case a, l and r are chosen for comparison. For example, look at the difference between these letters in Caslon Oldstyle and Bodoni Modern in figure 15. Notice that where the Caslon (left) is rounded, the Bodoni is usually

straight. Note particularly the serifs on all letters and you will see the angular style of Modern in contrast to the curving design of Oldstyle.

ITALIC TYPES

Italic type was originated by Aldus Manutius in 1501 when he startled the educated world by publishing a volume of Vergil printed entirely in this new, slanting letter. Like a proud father, Aldus wanted his offspring to be named after him and called the type Aldine. But, for some reason, printers started calling it Italic in honor of Italy where Aldus worked, and Italic it has been ever since.

Practically every type face in use today has a corresponding Italic font. And almost without exception they are attractive because they have the appearance of being handwritten. Italic is used chiefly to relieve the monotony of the many upright or vertical faces now in use; and to emphasize or set apart certain words or phrases, such as titles, signatures, credit lines, or foreign words or phrases. Don't use too much Italic—it is hard on the eyes when used in long sections—and don't use all caps in Italic if you can avoid it.

Compare the example of Bodoni Roman and Italic in figure 16 and you'll see how the Italic differs from the original even though the essential characteristics remain the same.

This line is set in Bodoni Roman.

This line is set in Bodoni Italic.

Figure 16.—Comparison between Roman and Italic.

SWASH LETTERS are similar to Italic, but they are embellished by additional swirls and curves known as swashes. You will often be able to use them with Italic to dress up a page which might otherwise be

bare and unattractive. Figure 17 illustrates a few Swash letters.

Figure 17.—Typical letters in Garamond Swash Italic.

TEXT TYPE

When book pages were written with quill pens, the form of lettering used was known as TEXT LETTERING and it has formed the basis for what we know now as TEXT TYPE.

Text is a beautiful type and is frequently used for invitations and announcements. You'll find at least one or two fonts of Text type in every print shop, and you'll use them often.

You should know Text because it is a necessary part of every printer's equipment. You'll find that, usually, Text is used only for short copy and it should be closely spaced to give a true Gothic effect. Never use it on cheap jobs—save it for use on something religious or formal. Like your "whites" in the middle of winter on the North Atlantic run, TEXT CAN LOOK OUT OF PLACE IF IT IS NOT PROPERLY USED.

Text is easy to spot. Figure 18 features a line of Cloister Black which will give you an idea of what a distinctive type face it is.

Figure 18.—12 point Cloister Black.

Other text types you will run across are similar to this. You'll probably find one or more of these faces in every print shop: CHAUCER TEXT, ENGRAVER'S OLD ENGLISH, PRIORY BLACK TEXT, WEDDING TEXT, or GOUDY TEXT.

SANS-SERIF TYPE

If you know what "Sans" means in French, you know what "Sans-Serif" is. And if you don't know French, "Sans" means "without." So, "Sans-Serif" means "without serifs"—those little cross strokes at the ends of the letters that you've seen in both Old-style and Modern Roman.

Up until recent years, Sans-Serif faces were plain, substantial letters used mostly for big, poster headlines. But in the last few years Sans-Serif has had its face lifted—from the ugly duckling of the type family it has been turned into an up-to-date, attractive type that has many uses.

Here are examples of both old and new Sans-Serif. Note the plain, heavy appearance of FRANKLIN GOTHIC:

This line is set in 12 point Franklin Gothic

And then note the graceful, modern appearance of VOGUE, one of the newer Sans-Serif faces:

This line is set in 12 point Vogue.

Other Sans-Serif faces are BERNHARD GOTHIC, FUTURA, KABEL, METRO and TEMPO.

CURSIVE TYPE

Because both handwriting and typesetting are methods of putting thoughts down on paper, it is natural that some kinds of type would follow styles in handwriting and hand printing. They are called SCRIPT or CURSIVE TYPE.

There's nothing new about this kind of type—Cursive faces were designed by such famous fifteenth-century type-founders as Garamond and Granjon. And through the centuries, as styles in handwriting changed, Script faces followed. Today, certain Cursive faces closely resemble modern handwritten letters.

When you write by hand, you know that each letter in each word is connected. So in many Script types, each letter is connected, too. That makes many of these types look just like handwriting—but it has added more grey hairs to printers' heads than almost any other typographic development. Here's why. These connecting links (called "kerns") project beyond the body of the type and are EXTREMELY easy to break off.

Many a line of Script type has gone on the press and suffered a broken kern in the middle of the run. You'll have to use great care in handling Script type, but you'll find them called for frequently in modern layouts.

Here is a line set in a Cursive type. It is BERNHARD CURSIVE, a graceful, well-rounded, feminine-looking letter—

This line is set in 14 point Bernhard Cursive

Other kinds of Script or Cursive type are EVE, PARK AVENUE, TRAFTON and RALEIGH CURSIVE.

CONTEMPORARY TYPES

From the types described this far, you might think that all type designers died about the middle of the sixteenth century. That's not true. For there are many type designers at work today, cutting type faces that will take their place alongside the older ones we've been discussing. These types that have been in use for only a few years are called CONTEMPORARY TYPE FACES. Take a look at some of them.

CONTEMPORARY SQUARE SERIF

Strangely enough, SQUARE SERIF faces look like Sans-Serif with serifs added. That is, they are square cut with lines of even weight and are precise and geometric-looking, somewhat like the Sans-Serif

faces. But they have this difference: all Square Serif types have heavy, square, even serifs. Some of the most common Square Serifs are GIRDER, BETON, STYMIE, KARNAK, MEMPHIS, CAIRO and TOWER. Here is a line set in Beton to give you an indication of what this class of type face looks like:

This line is set in 12 point Beton Light

CONTEMPORARY ITALIC AND SCRIPT

You can't mistake modern SCRIPT and ITALIC type faces. They're up-to-date and modern American in appearance and feeling. Generally speaking, they are bolder and stronger than the old type Italic and Script faces and they are used primarily as eye-catchers. Among these attention getters are GILLIES GOTHIC, KAUFMANN, KAUFMANN BOLD, ROMANY, PIRANESI ITALIC, and KEYNOTE. Look at the strong characters of Kaufmann Bold, for example. They're typical of this class of type face.

This line is set in 12 point Kaufmann Bold

CONTEMPORARY SHADED, OUTLINE AND INLINE

In the past, type faces were sometimes varied by creating a shaded effect or adding extra lines to the letter. But modern type designers have added some entirely new type faces in this classification and, on occasion, you can use them to add a slightly different touch to some of your productions.

Some of the type faces in this class are THORNE SHADED, GRAVURE, GARAMOND OPEN, BODONI OPEN, LILITH, CAMEO, GOUDY HAND-TOOLED, GALLIA, and CASLON OPEN. Here's Goudy Hand-tooled as an example of this kind of type:

This line is set in 12 point Goudy Hand-tooled

CONTEMPORARY TITLE AND DISPLAY FACES

Another classification of modern type is a series of dressed up title and display faces used primarily for headings. Most of these have heavy, tall, VERTICAL lines and narrow, flat HORIZONTAL lines. These faces look condensed, and yet they do not have a compressed appearance. Examples of this type are ULTRA BODONI, CORVINUS, OTHELLO, EMPIRE, HUXLEY VERTICAL, PHENIX, SPIRE, and ONYX. Similar to most of the types in this class is Onyx. Note the high effect and the smart modern appearance of this type:

This line is set in 18 point Onyx

BORDERS AND ORNAMENTS

Like the frame on a picture, a border around a printed job helps give it a finished appearance. Not all printed pieces will require borders, but when you do use them they should be selected with great care. Six types of borders are shown in figure 19. Never

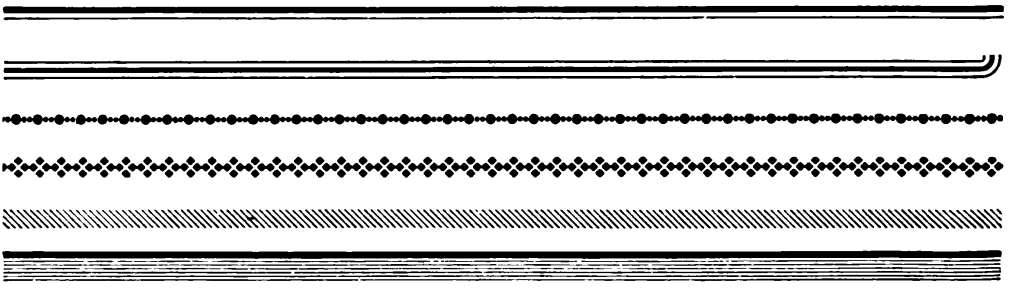


Figure 19.—A group of typical borders.

use a border that will detract from the job itself—always use one that will harmonize with the type and add to its effectiveness.

You'll find two types of borders in common use. STRIP BORDERS are cast in strips in which the design is continuous. UNIT CAST BORDERS are made up of individually cut units which you can fit together to form a complete border.

Also used to add interest to type jobs are TYPE ORNAMENTS. They are not used to replace illustrations, but are generally conventional designs for general use. They come in many different sizes, shapes, and designs and when properly used will give an attractive and interesting effect. Figure 20 illustrates six type ornaments—you'll find many more in almost every print shop.

Figure 20.—Typical type ornaments.

What might otherwise be a plain, uninteresting page can sometimes be made more attractive by the use of INITIAL LETTERS. These are ornate, large size, capital letters used at the beginning of a chapter or paragraph. Naturally, they should not dominate the page or detract from easy reading. They are available in all sorts of styles and you should make sure you pick one that harmonizes with the type you are using. Examples are shown in figure 21.

The Chinese are thought to be the first people to use printed material in their daily lives.

GUTENBERG, father of modern printing, was born in Mainz, Germany, in 1397 and died in 1468.

One of the most famous of the early type designers was Nicholas Jenson, a Frenchman, who worked in Venice in the fifteenth century.

Benjamin Franklin, who won his first fame in the printing field, later became one of the founders of the Republic.

Figure 21.—Use of initial letters.

SMALL CAPS

You will notice that, throughout this book, SMALL CAPITAL LETTERS, LIKE THIS, have been used to emphasize certain words or phrases. They're used in the same way that italics are used in many cases. As a matter of fact, most printers would use italics where this book has small caps, but many people feel that the small caps make a cleaner, neater-looking page. You can use either—but you'll probably have to follow the general practice in your particular shop.

CHAPTER 4

THE COMPOSING ROOM

HERE IS YOUR AMMUNITION

In a way, the composing room is the "ammunition storehouse" of the print shop. You might consider the printing presses as the "big guns" of your shop—they fire rounds of paper shells in the war of words. But it is in the composing room that you "ready the ammunition"—prepare it to be fed into the "big guns."

Type is the principal ingredient of your ammunition and the first step in handling type is to become familiar with the CASE from which you will select your letters.

The two most commonly used type cases are the NEWS CASE and the CALIFORNIA JOB CASE. They are similar—so if you know how to use one, you can quickly master the other.

THE NEWS CASE

The NEWS CASE really consists of two separate cases --the CAP CASE which holds the capital letters and some special characters, and the LOWER CASE which

contains the small letters, punctuation marks, figures, and spaces.

Figure 22 shows the two cases that make up a complete news case. As you will see, the cap case contains both regular capital letters, which are used with lower case letters, and small caps which are used to

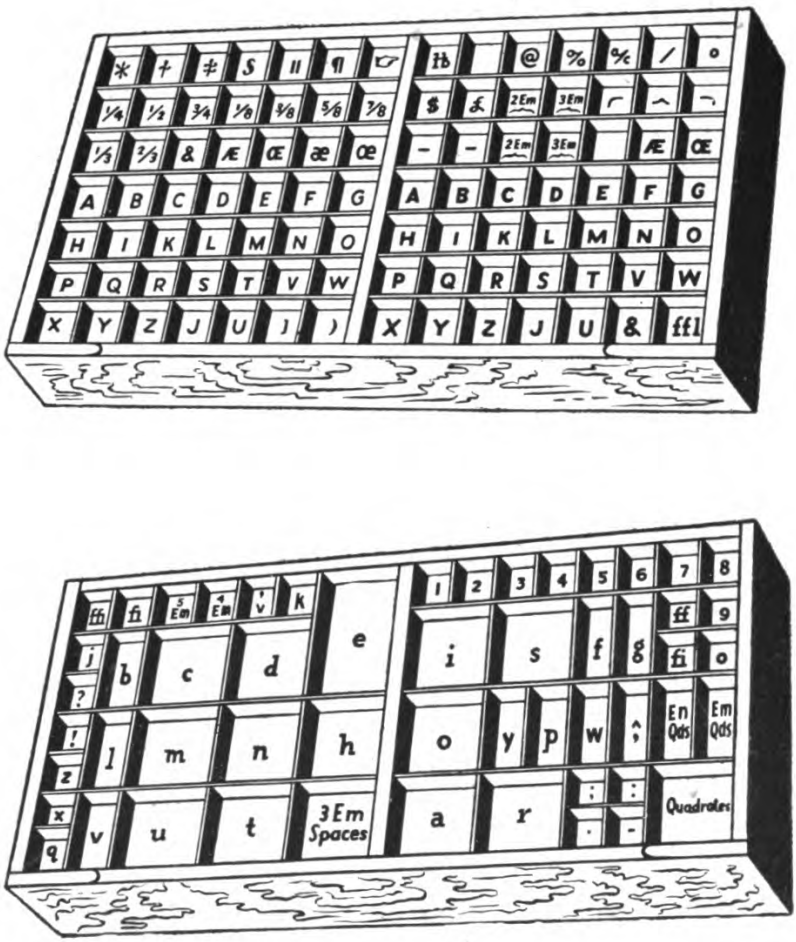


Figure 22.—News case—upper and lower.

form words in all caps of a small size. All capital letters are arranged in alphabetical order, except for "J" and "U." Here's where we drag in a bit of history. The original Roman alphabet, from which ours is taken, did not have any "J" "U" or "W." The "W" was added first and is in its proper place, but "J" and "U" weren't added until late in the sixteenth century.

So, instead of being inserted in alphabetical order, they were just added at the end of the case.

The lower case letters are NOT arranged in alphabetical order, but by FREQUENCY OF USE. Thus, "e" which is the most frequently used letter, occupies the largest space in the center of the case. The letters "j," "z," "x," and "q" are the least used, hence they are along the side in the smallest compartments.

THE CALIFORNIA JOB CASE

Today you'll probably find the CALIFORNIA JOB CASE used in most print shops. It is more compact and

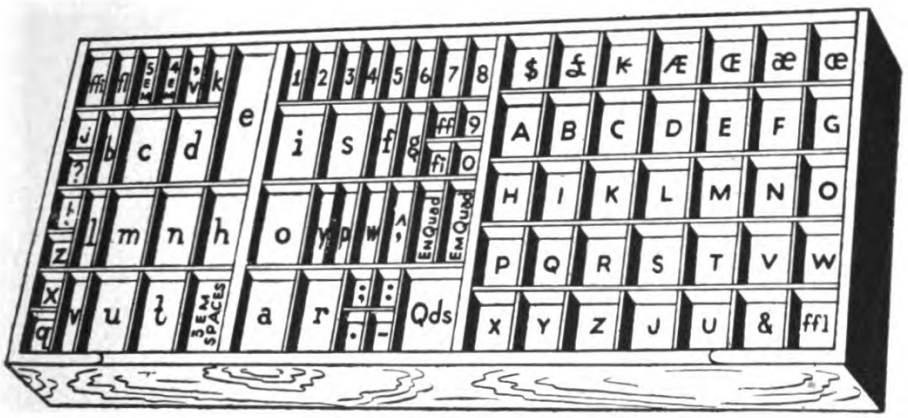


Figure 23.—California job case.

streamlined than the news case because it contains both upper and lower case letters in one case. The less frequently used characters have been eliminated to make this possible.

The space at the left, as shown in figure 23, is essentially the same as the lower case news case, and the space at the right contains all the capital letters in the same order as the upper case news case.

TYPE CABINETS

Many different kinds of TYPE CABINETS have been designed for storing these type cases. One of these is shown in figure 24. Cabinets may be made of wood or

metal, may be one or two cases wide and may have extra spaces for leads, slugs, and other spacing material. Usually they have a top space especially designed for easy use in setting type, with room for a

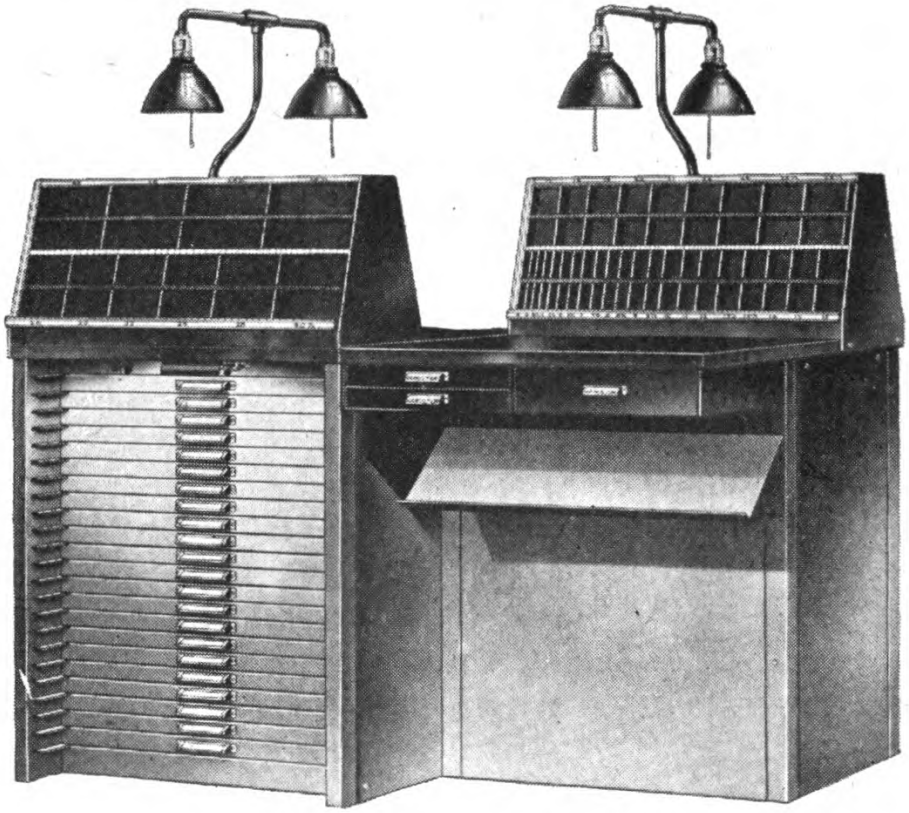


Figure 24.—A typical type cabinet.

complete font and space for the copy you are going to set.

HOW TO SET TYPE

When you are setting type, you will be known as a COMPOSITOR. The process itself is called COMPOSITION or TYPESETTING. Today, a large part of the typesetting is done by machine, but there will always be a need for hand-set type for headings and small jobs. A knowledge of linotype, monotype, and other typesetting machines is not required for Printer Second Class, so don't worry about them now.

The first thing you should do is LEARN THE CASE. The better you know it, the faster you can set type. You must know not only the more frequently used letters—those in the largest compartments—but the less used letters and the punctuation marks, figures, and spacing materials, too. If you have to stop and figure out where certain letters are, you will be slowed down—just like a typist who has to hunt for the keys. Probably the best way to learn the case is to practice drawing it with the letters in the correct position. When you have a few minutes, grab a pencil and a piece of paper and see how much of the case you can draw from memory.

You'll find some strange looking characters in the case. They are LIGATURES—letters which have been combined, such as ff, fi, fl, ffi, and ffl. They are used to save time and space in composition—and they're also a help in preventing the breaking off of kerns.

THE COMPOSING STICK

Pick up a composing stick and get used to it. It's going to be your constant companion in setting type. As you will see, it is a three-sided metal tray, one side of which can be moved backward and forward so you may set lines of different lengths. The moving side is called the "KNEE" and is held in place by a clamp or screw. Practically all composing sticks now in use have a scale marked on one edge so you can set lines of any length without using a separate measure.

HOW TO HANDLE THE COMPOSING STICK

After you've mastered the type case, you're ready to tackle the composing stick. Here's how to go about it. Hold the stick in your left hand with the fingers BELOW and your thumb OVER the tray to guide the characters into place. This preliminary position is shown in figure 25. As you will see, the open side of the stick faces outward and the stick is held at an angle so the characters won't fall over.

THE SECRET OF SETTING TYPE

To coin a phrase, "Position is everything"—and that's especially true at the type case. The first step in setting type is to take a natural position in front of the type case, either standing or sitting, so that you can reach the whole case easily. The copy which you are following should be directly in front of you so you can read it without difficulty.

Now pick up the composing stick and set the "knee" to the width desired. Pick the characters from the case with the thumb and first finger of the right hand and insert them in the stick from LEFT to

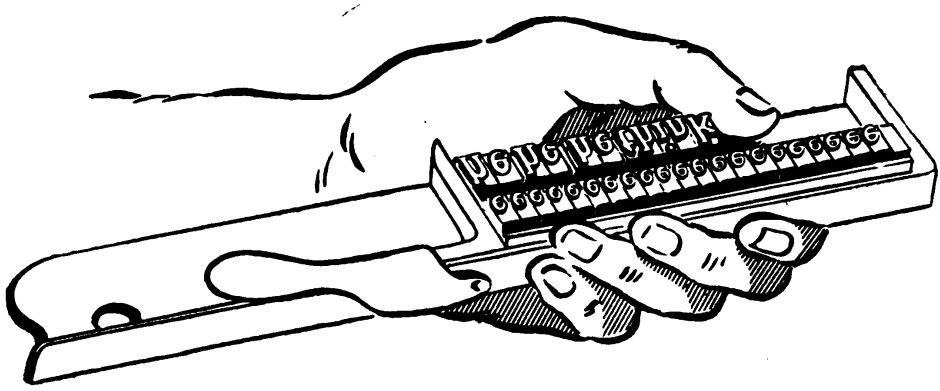


Figure 25.—The correct way to hold a composing stick.

RIGHT, with the NICKS UP and the FACE OUT. You must hold the characters in place by using the thumb of your left hand to steady them.

You may have heard that type is set backward. IT ISN'T—the words are formed from left to right just as in writing but the characters are put in the stick upside down. Each succeeding line is put in ABOVE the line preceding it, so the paragraph reads UP instead of DOWN as it finally appears in the printed page.

Figure 26 shows a paragraph of type as it appears in the form and as it appears on the printed page.

SPACES AND QUADS

Before we get into the subject of spacing, let's discuss the units which are used. The basic unit of spac-

ing material is the EM QUAD, which is a square of the same size as the type with which it is used. Thus, an em quad used with 8 point type is 8 points square, one used with 12 point type is 12 points square, etc. A 2-EM QUAD is twice as wide as an em quad, and a 3-EM QUAD is three times the width of the basic em-quad unit.

Smaller units are the EN QUAD, which is half the width of the em quad; the 3-EM SPACE, which really means "three-to-the-em" and is one third of an em;

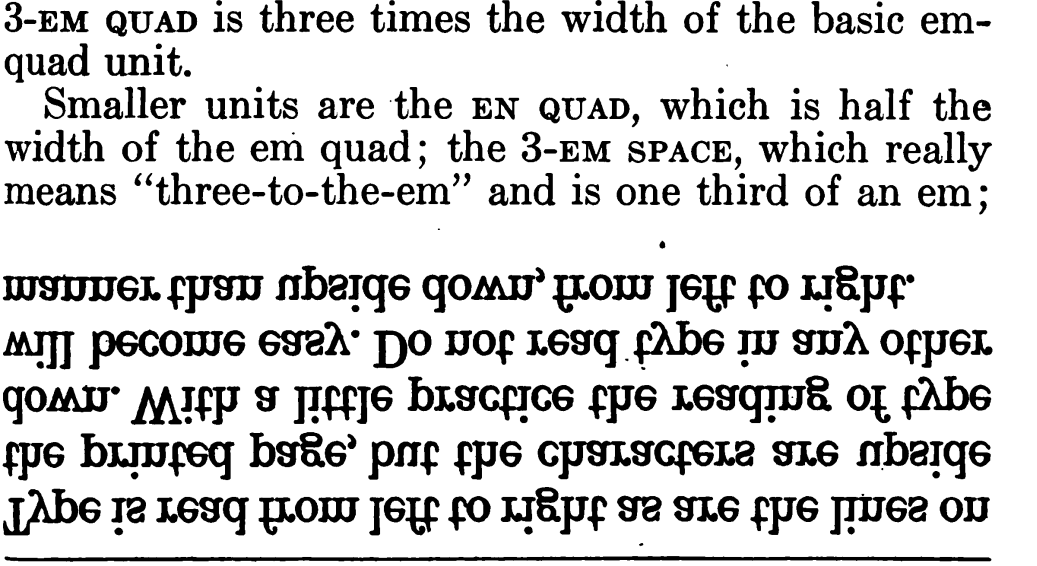


Figure 26.—How to read composed type.

the 4-EM SPACE, one quarter the width of an em; and the 5-EM SPACE, one fifth the width of an em. Figure 27 shows the comparative sizes of the more commonly used quads and spaces.

SPACING AND JUSTIFICATION

Ordinarily an em quad is set at the beginning of a paragraph and a 3-em space is placed after each word as a temporary spacing arrangement. Naturally, unless further spacing were done, the ends of the lines would be uneven, just as they are in type-

writing, which has no flexible method of spacing. The process of the respacing of words to make each line uniform is called JUSTIFICATION.

Lines are justified by INCREASING OR DECREASING THE SPACES BETWEEN WORDS. To increase the space,

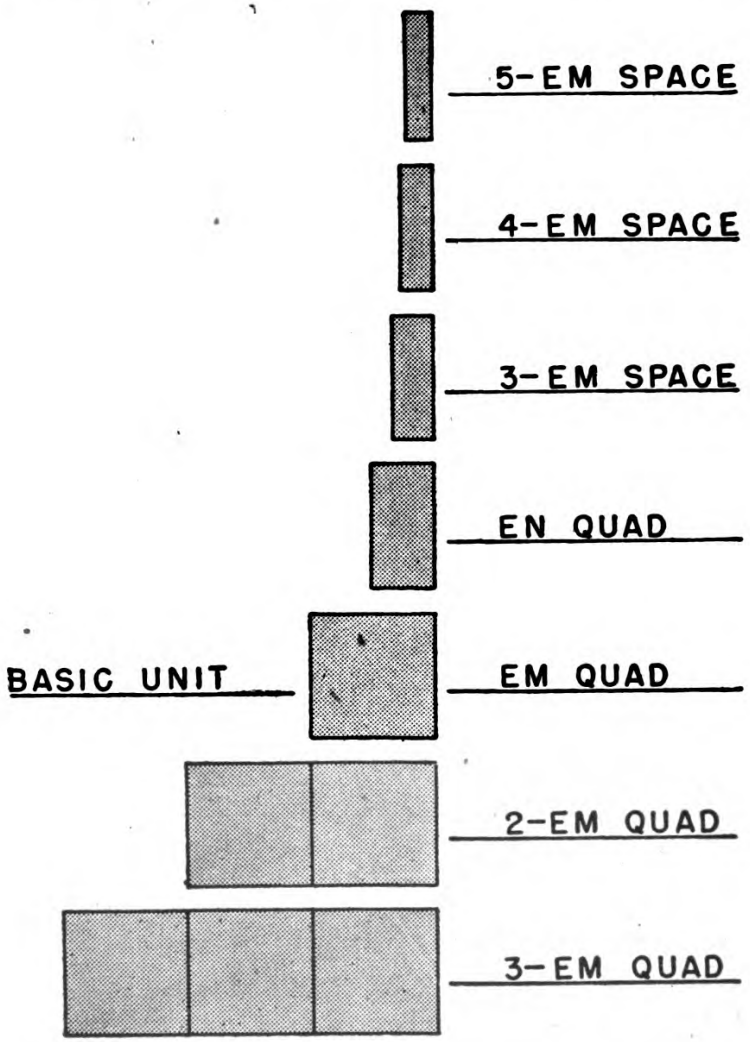


Figure 27.—Comparative length of spaces and quads.

you take out the 3-em spaces between words and replace them with en quads or combinations of thin spacing materials, such as two 4-em spaces. To decrease space between words, you replace the 3-em spaces with 4-em spaces, thus allowing room for more letters at the end of the line. You'll have to watch it, because spaces between words must be kept as uni-

form as possible to insure easy readability and a nice-looking job.

These two paragraphs show the difference between justified and non-justified lines. The first paragraph is not justified and the second one is.

These two paragraphs show the difference between justified and non-justified lines. The first paragraph is not justified and the second one is.

Figure 28.—Before and after justification.

HINTS ON SPACING

As you noted earlier, the indention of a paragraph is usually made with an em quad. In unusual cases, such as when you are setting extremely long lines, this space may be increased; or, in narrow composition, it may be decreased. And, of course, the last line of a paragraph does not have to be justified—the extra space may be filled with any combination of quads and spaces that fits.

When you are starting a new sentence within a paragraph, you'll run up against the problem of spacing between sentences. There are several generally accepted methods. One calls for three times as much space between sentences as you have used between words. Thus, if you are using a 3-em space between words, you'd use an em quad between sentences. Other printers rely on the optical illusion created by the period and use the same (or only slightly larger) space between sentences that they have used between words. Either style may be acceptable in your print shop.

Sometimes, you'll find it impossible to allow exactly the same space between words in a sentence. The rule then is to allow wider spacing between the

longer words and those that start or end with tall letters. Another tricky optical illusion makes the extra spacing less noticeable when used in this way. Don't use too much spacing, though. You should tend toward close rather than wide spacing. And remember, you'll be judged as a compositor largely by the way you handle spacing.

LETTER-SPACING

Placing thin spaces between the LETTERS of a word is known as LETTER SPACING. This is a different thing from justification and is seldom done except in headings or display composition. Used in ordinary reading matter, you'll find it hinders easy readability.

This line is letter-spaced.
This line is not letter-spaced.

Figure 29.—An example of letter-spacing.

LEADS AND SLUGS

There's one more type of spacing you should know about. That is SPACING BETWEEN LINES. The ordinary unit used for this purpose is the 2 POINT LEAD, which is a strip of type metal 2 points thick. SLUGS are usually 6 points or 12 points thick and are used when more space is needed between lines. It is from the use of leads and slugs that we get the term "LEADED MATTER"—a block of copy with leads between the lines. Copy set without any spacing between lines is known as "SOLID MATTER."

HANDLING TYPE

Now we can assume that your type is selected and set, with the proper amount of spacing. All this has been done while the type is in the composing stick; now the next step is to REMOVE IT FROM THE STICK AND

PUT IT IN A GALLEY. A galley is a metal tray which is used to hold the sections of type which are taken from the stick.

But wait a minute. Type is pretty tricky stuff. You have to "handle with care" all the way through, or you're going to have a large piece of "PI" on your hands. "Pi" is what printers call a mess of scrambled type. So, if you drop your type while transferring it from the composing stick to the galley and your Chief tells you to pick up the "pi," DON'T start for the ship's galley—just pick up the type.

TAKING THE TYPE FROM THE STICK

You won't be troubled very much with "pi" if you follow these few simple rules for transferring type

Figure 30.—Removing type from stick.

from the composing stick to the galley. Here's the first thing to ask yourself—IS THERE A LEAD AT THE TOP AND BOTTOM OF THE TYPE? If not, you're going to find the type difficult to move.

When there is a lead top and bottom, you're ready to move the type to the galley. Place the stick on a flat surface near the galley. Leave the clamp closed and then grasp the entire block of type firmly with the fingers, as shown in figure 30. Slide it forward gently, raise it, and place it in the galley.

ON THE GALLEY

To receive the type, the galley should be placed with the open end AWAY from you, and that end raised slightly so the type won't fall over. Lower the type to the galley and place it against the edge in the lower left-hand corner. Once the type is safely in position in the galley, you can remove the extra leads that you used as protection in transferring.

TYING THE TYPE FORM

When you have filled the stick several times and placed all the type on the galley, the completed job is known as the FORM, and it is then ready for you to pull a proof.

The next step is to tie the type so it can be handled more easily. Be sure to use a piece of string that's

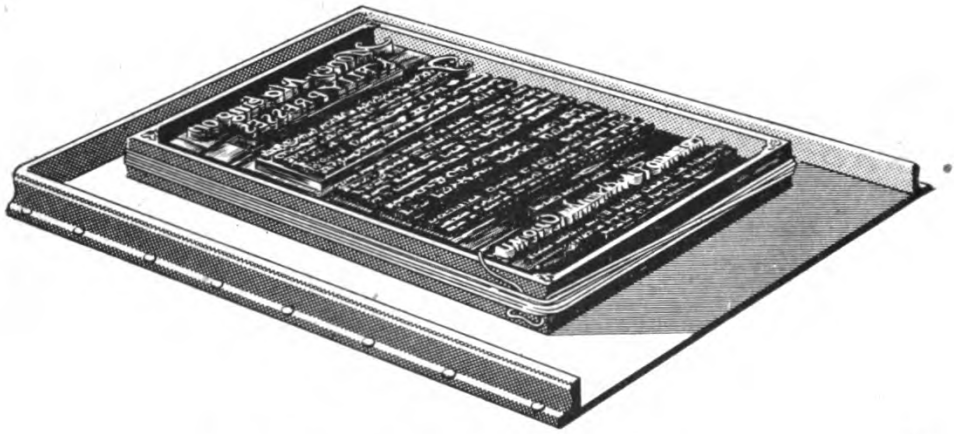


Figure 31.—A type form tied correctly.

long enough to go around the type FOUR OR FIVE TIMES. Then, beginning at the outer corner, wrap the string all the way around the type. When you come to the end of the string, tuck it under the turn at the starting corner and draw it back to form a loop, as shown in figure 31. Never make a knot in the string, because it would be too difficult to untie.

OFF THE GALLEY

After the form has been tied, it is an easy matter to move it off the galley. For example, to put it on the imposing stone—the table used by the make-up man—just tilt the galley and slide the type off. Or to move it back on the galley from the imposing stone, place the galley on the COFFIN (which is the recessed frame AROUND the stone) and slide the form back in the galley.

TYPE DISTRIBUTION

When your type form is in the galley and ready for proofing or printing, it is a "live form." After it has been used and the type characters are ready to be put back in the case, it is called "dead." The process of taking type from a "dead" form and putting it back in the case is called DISTRIBUTION.

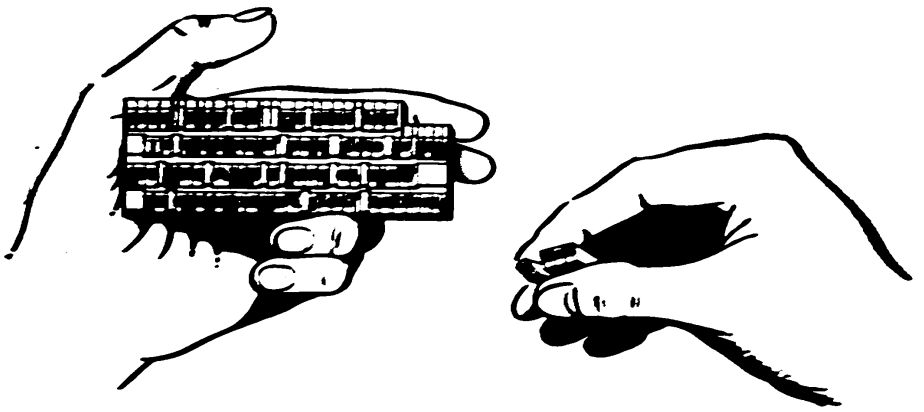


Figure 32.—Position for holding type to be distributed.

BEFORE it can be put back, however, you'll have to clean it. This is usually done with benzine or gasoline. Then the string is removed, and you're ready for the distribution.

NOW—ARE YOU SURE YOU KNOW WHAT CASE THE TYPE SHOULD GO INTO? If your type is all of one kind, your problem is simple. But if you've been using several different kinds of type, you will have to examine each character carefully. Here's where the NICKS are helpful. Many types are so similar that it is hard to

tell them apart just by looking at the faces. But you'll find that the nicks will help you tell them apart because you can MATCH THE NICKS in all characters of one kind.

To distribute type, just take one or two lines from the bottom of the form and hold them in a horizontal position between the thumb and middle finger of the left hand. You may want to use your index finger as a support. Then pick up as many characters as you can hold conveniently and put them back in the case. After you have gained a little speed in distribution, you'll find that you can distribute characters practically by the word instead of by letters. But until you are sure of yourself, go slow—and practice.

Here's a little trick of distribution—put the type into the case FEET FIRST. Then there'll be much less danger of damaging the fragile kerns especially in Script faces.

Quads and spaces must also be returned to their proper compartments. You may find it a little difficult at first to tell some of them apart, but after a while you'll be able to tell whether a space is 3 ems, 4 ems, or 5 ems by feel.

CHAPTER 5

PROOFING AND PROOFREADING

MISTAKES WILL HAPPEN

When your type is set, your spacing is taken care of, and your type is carefully tied up on the galley, the next step is to FIND OUT HOW MANY MISTAKES YOU'VE MADE.

Errors are found by reading a PROOF of the type you have set. You'll find that, in most cases, a proof will disclose at least a few errors, because, as somebody said, "To err is human—as nobody knows better than a proofreader." But don't be discouraged at that—the chief reason you make a proof is to find out your errors BEFORE the type is locked up and goes on the press. A proof will also give you a chance to inspect the job, and to see how it looks as far as type arrangement and design are concerned.

There are several kinds of proofs which you will be taking. So, let's first find out what they are.

The first proof that is pulled after the type is set is called the OFFICE PROOF. This is for use in the shop only, and its purpose is to show how many typograph-

ical errors there are in the job. After this proof is read and the corrections marked, it is returned to the compositor. He makes the changes indicated and takes another proof called the OFFICE REVISE.

This proof is read, and if it is correct, a clean copy, known as the CUSTOMER'S PROOF, is sent along to the one who ordered the job. On board ship this may be the Executive Officer, the Supply Officer or whoever sent you the job to be printed.

If the customer approves of the proof, he marks it "OK" and adds his signature or initials. If some corrections are needed, he marks it "OK with corrections," and, ordinarily, you wouldn't have to send him another proof. However, if corrections are very numerous, it is usually a good idea to send another proof as an extra precaution.

When all corrections have been made and the proof has been approved by both the customer and the proofreader, the form is ready to go to press. Then, one of the first impressions taken, known as a PRESS PROOF, is sent to the proofreader for a final check. Usually the press proof must also be checked by the foreman or superintendent of the shop before it is finally run.

Other proofing terms you should be familiar with are: GALLEY PROOF—a proof of a long job, such as a book, which has NOT been divided into pages; a PAGE PROOF—a proof of a book or booklet divided into the correct number of pages; and a PLATE PROOF—a proof made from a printing plate, not from the original type set-up. More about plates later.

PLANER METHOD OF TAKING PROOFS

Proofs may be taken in several ways. The simplest, but not the best, method is known as the PLANER METHOD. This method doesn't even require a proof press and it can be done with just a few simple tools. But the proof obtained is not so sharp and clear as may be obtained by other methods.

To take a proof by the planer method, you just put the tied type form on the imposing stone. Ink the hand roller, or BRAYER, by rolling it over an ink slab to distribute the ink evenly; then roll the brayer across the type several times. Now place a sheet of proof paper (you may have to dampen it) over the entire form, and place a PROOF PLANER over the paper. Tap

Figure 33.—A sliding-bed type of proof press.

the planer firmly with a mallet. Naturally, you must be careful not to move the paper during the process, or the proof will be smudged. Now just lift the paper off by one corner and you'll have a satisfactory proof which can be checked for correctness.

THE PROOF-PRESS METHOD

A much quicker method which also results in better looking proofs, is the PROOF-PRESS METHOD. There are

two main types of proof presses, shown in figures 33 and 34. In one, the type bed remains stationary and the cylinder moves OVER it. In the other, the cylinder remains stationary and the type bed moves UNDER it. However, the operating principles are practically the same in both cases.

To pull a proof on a proof press, first put the type form in a galley and place the galley on the bed of the press. Then ink the surface of the type form with the brayer by rolling it first across the ink slab then across the type. Place a sheet of proof paper over the

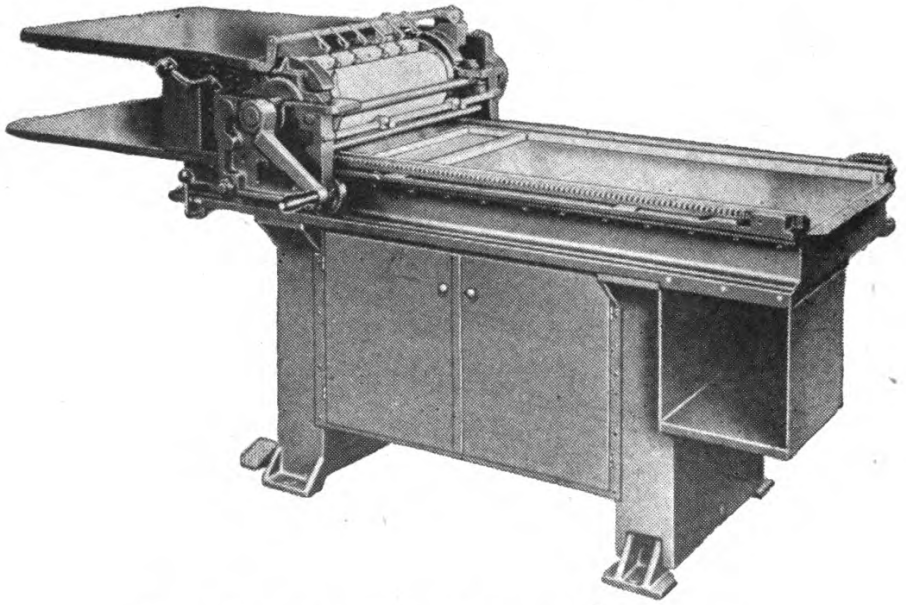


Figure 34.—A stationary-bed type of proof press.

type, and turn a crank. Either the cylinder will roll over the type or the type will roll under the cylinder —and there's your proof.

There are also power-driven proof presses, but unless you are in a pretty good-sized print shop, chances are you won't run into them. They are used principally in newspaper offices and can be set to turn out hundreds of proofs an hour.

It is, of course, possible to injure yourself or damage the proof press while operating it—but not if you follow a few simple SAFETY-FIRST RULES. Naturally,

you must see that the galley is in the correct position before operating the press. And you should never try to adjust, oil, or ink the proof press while it is in motion, or you may find you're lifting what's left of your fingers along with the proof. All adjustments should be made before you start. If you keep your mind on the job and your hands out of the way while the machine is moving, you'll be able to do the job with ease and safety.

CLEANING TYPE

After your proof has been taken, and while it is being read, you'll find time to do the necessary job of CLEANING THE TYPE. This cleaning must be done every time you take a proof, and it must be done IMMEDIATELY—or the ink will harden and you'll have a difficult time removing it. Moreover, if ink IS allowed to harden in the type you'll find that filled-in letters will show up in jobs printed weeks later, causing you all sorts of trouble.

Usually printers use gasoline or benzine for cleaning type. Either one is applied with a soft, clean rag or a special kind of brush. Don't use too much cleaner, however, because it will wash the ink and dirt down between the letters where it will literally "gum up" everything.

CORRECTING TYPE FORMS

Now that you have cleaned the type, let's say the proof is back from the proofreader and that he has discovered some errors. So, you have to make a few changes in the type. Here's how it's done.

The first thing to do is to take the job to the type case from which the form was set so that the type is handy while you are making the corrections. You will be using the same type in making your corrections, so you will need the same font that you used originally. Usually the galley is placed on a slanted

shelf on top of the type cabinet so you can work with a minimum of effort.

Always place the form in position with the head towards you so that the type characters are upside down and the copy reads up from the head—just as when you set it originally. Then find your first error on the proof sheet. Lift the line in which the error appears by pressing lightly on one end with a composing rule or pair of printer's tweezers. Be sure to hold the other end of the line in place by keeping a finger on it. And be sure to do it slowly—if you push the line up too fast, you may knock all the letters out of position. When the line is up you can pick out the incorrect letter, either by hand or with tweezers, insert the correct one, and drop the rest of the line back in position.

That process is simple enough and you can use it for one-letter changes, inversions, or changes which do not affect the length of the line. However, any time your changes involve justification—that is, if they change the length of the line—it will be necessary to return the type to the composing stick for justification. Every line must be exactly the same length before the form is finally locked up for the press.

When you return the type to the composing stick, it is an easy matter to make the changes that are necessary and to justify the line exactly as in the original composition. First, of course, you'll have to remove the incorrect characters or lines. Then, if it is possible to use the type you have already set, you insert the corrections just as you set the type originally. If there are a lot of corrections, involving many lines or a complete paragraph, it is sometimes easier to reset the whole paragraph.

When making corrections you'll run across a few technical terms that you'll need to understand. They are commonly used in print shops to refer to various kinds of changes in the type set-up. An OUT, for

example, refers to an omission of type that should be in the form. A RUN-IN means that there should be no paragraph in a place where you have made one. A RUN-OVER refers to words that are to be transferred from the end of one line to the beginning of the next. Its opposite is a RUN-BACK, which refers to words which

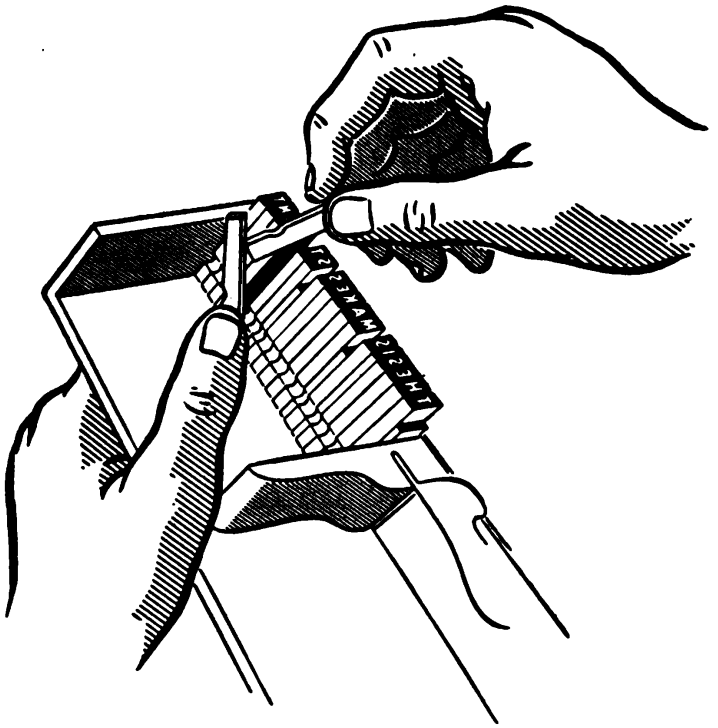


Figure 35.—Making corrections in the composing stick.

should be carried back to the preceding line. And a CARRY-OVER refers to one or more lines at the bottom of a page or column which are to be carried forward to the next page or column.

THE USE OF TWEEZERS

If you use TWEEZERS to remove type—handle them WITH CARE. Some shops won't even permit their use because it's so easy for unskilled hands to damage type with them. Here's what can happen. A greenhorn grasps the type with the tweezers and starts to pull, but the type is stuck. The tweezers slip, and snap across the face of the type. In a great many cases, he'll nick the type character and ruin it in

this way. So, NEVER PULL AND TUG AT TYPE WITH TWEEZERS. If YOU use them, use them with caution. And never use tweezers to push type back into place—you're almost sure to damage the type if you do. Use your thumb—that won't damage the type.

CODE WORK

You may find it necessary to do your own proofreading, or to help someone else with the job. You'll find it much easier and more accurate to team up, so that one person reads the copy aloud and the other marks the proof.

But, regardless of whether or not you actually do proofreading, it's necessary that you become familiar with proof marks. You'll be using them all the time to make the changes which the proofreader indicates. You'll find that they are really just a code used to save long, written explanations. For example, when you see the word "stet" on a proof, you'll know that this one word means, "Don't change this, even though a change was once indicated. Let it stand as is."

You may also find that proof marks vary somewhat in different shops. However, those shown here are generally accepted and understood by all. If your proofreader uses some that are different from those shown here, add them to the list and it won't be long before you'll have a complete list of all proofreader's marks used in your own shop. You'll find that it's necessary to memorize them sooner or later. Take a few minutes each day to run through them until you REALLY KNOW THEM.

That's the first step in getting these proof marks planted firmly in your mind. After you're pretty sure you know most of them, study some proofs that have come back for correction and see how many of the marks you recognize. You'll probably find that there are some marks you get wrong consistently. Then refer back to this list and get them straight.

PROOFREADER'S MARKS

⊙	Insert period.
⊙	Insert colon.
^/	Insert comma.
;/	Insert semicolon.
?/	Insert question mark.
!/	Insert exclamation point.
V	Insert apostrophe.
=/	Insert hyphen.
V or V	Insert quotation marks.
em /	Insert 1-em dash.
en /	Insert 1-en dash.
∧	Insert correction.
#	Insert space.
ld >	Insert lead between lines.
ⓠ	Question to author.
(/)	Parentheses.
[/]	Brackets.

¶	Paragraph.
no ¶	No paragraph.
	Less space.
	Close up.
	Push down space.
	Take out—delete.
	Delete and close up.
	Reverse.
	Use ligature.
	Indent one em.
	Indent two ems.
	Move to left.
	Move to right.
	Move up.
	Move down.
	Line up vertically.
	Line up horizontally.
stet.	Let it stand.
....	Let it stand—used under words, with "stet" in margin.
tr.	Transpose.

tr	Transpose letters.
sp.	Spell out.
ital.	Italics—used in margin.
—	Italics—used under words.
sc	Small capitals—used in margin.
=	Small capitals—used under words.
caps	Capitals—used in margin.
≡	Capitals—used under words.
lc	Lower case—used in margin.
x	Lower case letter.
bf	Bold face—used in margin.
~	Bold face—used under words.
Rom	Roman type.
wf	Wrong font.
V∧	Equalize spacing.
X	Broken letter.
run over	Carry over to next line.
run back	Carry back to preceding line.
out - see copy	Something omitted—see copy.

CHAPTER 6

THE STONEMAN

WHAT IS HE?

What is a "STONEMAN"? Is he a statue? A man who works with stone? A fellow who would turn his back on a Hollywood glamor gal? Those definitions may all be true, but that's not the way we're using the term.

A STONEMAN, in the printing field, is one who places the type form in the chase and locks it up for the press. Formerly this work was all done on tables with heavy STONE TOPS, so it was known as STONEWORK—and the man who did it was called the STONEMAN. There are two parts to stonework—the procedure of arranging the form in the chase is called IMPOSITION—that of locking the form is known as LOCK-UP.

In the preceding chapter you've seen how type is set, put on the galley, and proofed. Now, if we assume that all corrections have been made and everybody has approved the final proof, you're ready to take the last steps before the type goes on the press.

First, however, let's look at the tools you will be using when you're acting as a stoneman. There's the

IMPOSING STONE, for example. Today, it may not be a stone-topped table, although you will find these in use in some places. In many shops the table top will be of heavy, rustproof steel. Whatever it is, the surface should be perfectly smooth, large enough to handle the biggest form your presses will take; and the table must be standard height, which is 38½ inches. Usually the imposing stone will have several

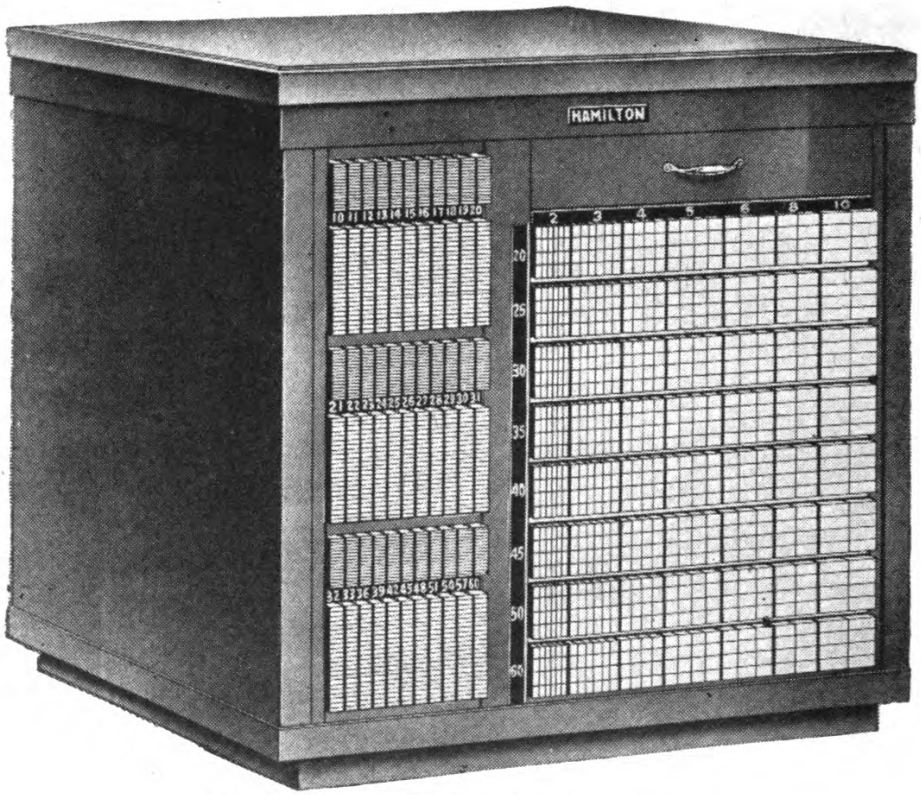


Figure 36.—A steel-top imposing stone.

drawers or shelves which hold the material you will need to make up the forms. Figure 36 shows one type of imposing stone that is commonly used in print shops.

You've been reading about the CHASE in previous sections. It is a steel frame into which the type form is inserted and locked before going on the press. Chases come in various sizes because they must fit all kinds of presses and must hold all the different sizes

of forms that you make up. The size of a press is determined by the size of the LARGEST chase that will fit on it. Thus, a press that will hold a chase with inside dimensions of 12 inches by 18 inches will hold a sheet that is 12 × 18 and is called a 12 × 18 press.

You'll find that chases must be accurate, and be strong enough to withstand great pressure. Hence they usually are made of welded steel—although in smaller sizes you'll sometimes find chases made of wrought iron or cast iron.

There are several varieties of chases now on the

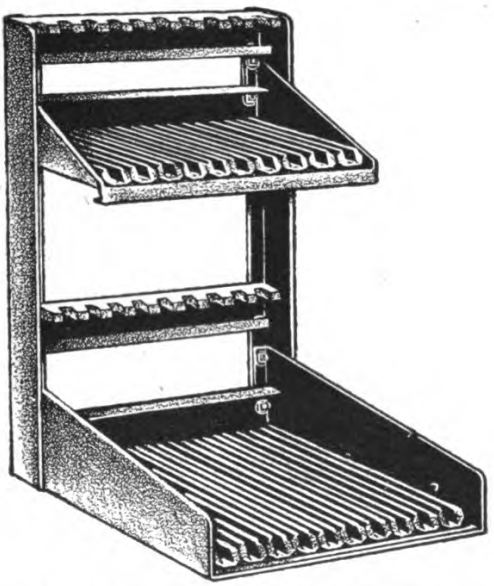


Figure 37.—A commonly used type of chase rack.

market. Some of them are patented because of their design, which permits easier adjustment of the form in the chase.

CHASE RACKS

When the chase is not being used, it goes into a specially designed CHASE RACK. The purpose of a chase rack is to save space. It is used for storing empty chases and those that contain type forms which are not being used. One of the most efficient kinds of chase racks is shown in figure 37.

KINDS OF FURNITURE

In printing, "FURNITURE" has nothing to do with tables, desks, or soft easy-chairs. It is the term that describes the material used to fill out the space around the form in the chase.

The lightest, cheapest (and probably most used) kind is WOOD FURNITURE. You'll find this available in a wide assortment of sizes—usually in widths of 2, 3, 4, 5, 6, 8, 10 and 12 picas and lengths of 10, 15, 20, 25, 30, 40, 50 and 60 picas. It is kept either in sepa-

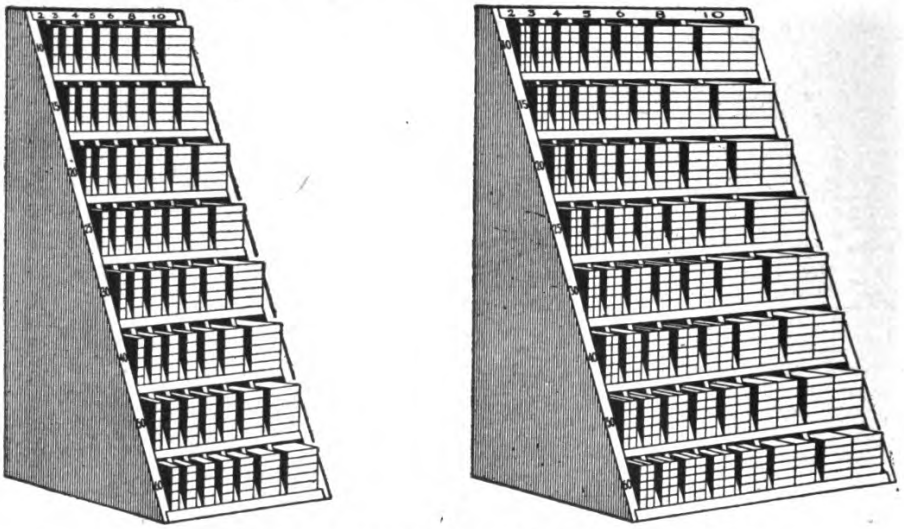


Figure 38.—Two cases of wood furniture.

rate racks, like those shown in figure 38, or in compartments under the imposing stone.

This type of furniture is made of selected hardwood and will last a long time, but eventually it is likely to warp. Whenever you notice that a piece of wood furniture has started to warp, throw it away. Its use might cause the type to loosen in the chase and cause trouble on the press.

You'll also find furniture made of lead, iron, steel, or aluminum alloy. This kind of furniture is, of course, more expensive than that made of wood, but it is also longer lasting and more accurate because it is not affected by temperature or humidity changes. Some of these pieces are shown in figure 39.

Perhaps as an indication of things to come, some printing furniture has been made of bakelite. Bakelite is a plastic and is extremely light, yet fairly strong. If, as some people say, we are at the beginning of the "Plastic Age," maybe sometime you will

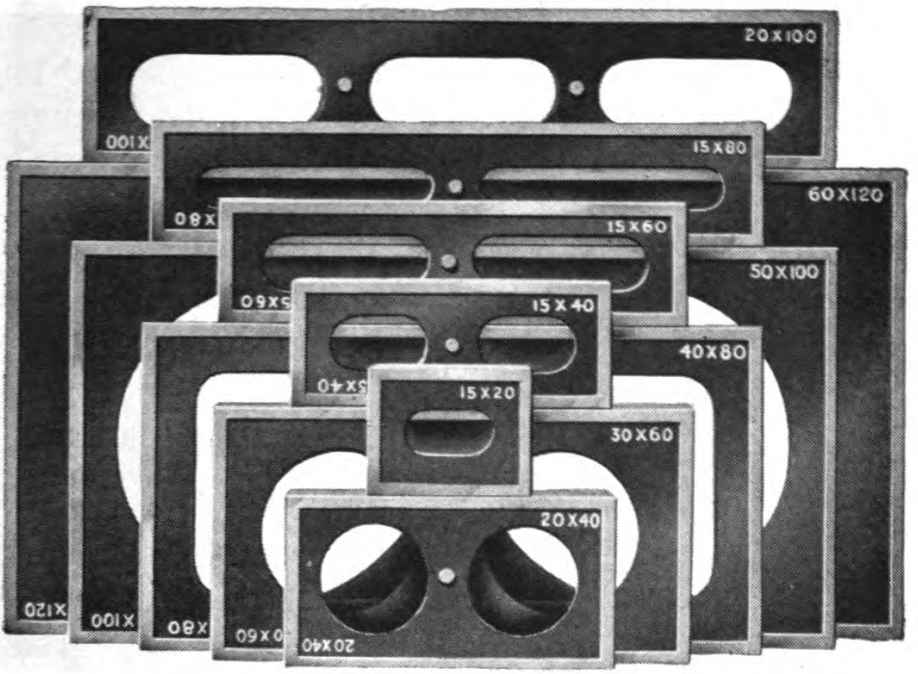


Figure 39.—Metal furniture.

be using many more plastic materials in various parts of the print shop.

QUOINS

To make the type lock-up secure, you'll be using QUOINS (pronounced COINS). These can be wedge-shaped Hempel quoins or the newer Challenge Hi-Speed quoins. They are tightened to force the furniture and type form together under great stress and thus make the whole job firm. There are several varieties now in use, and figure 40 shows you what the Challenge Hi-Speed quoin looks like. In this quoin, when the key is turned the quoin opens up. This

causes more pressure to be exerted on both the chase and the furniture to bind them together. In the older style quoins, illustrated in figure 41, the thick ends of the wedges are drawn closer together when the key is turned and this exerts a binding force on the form.

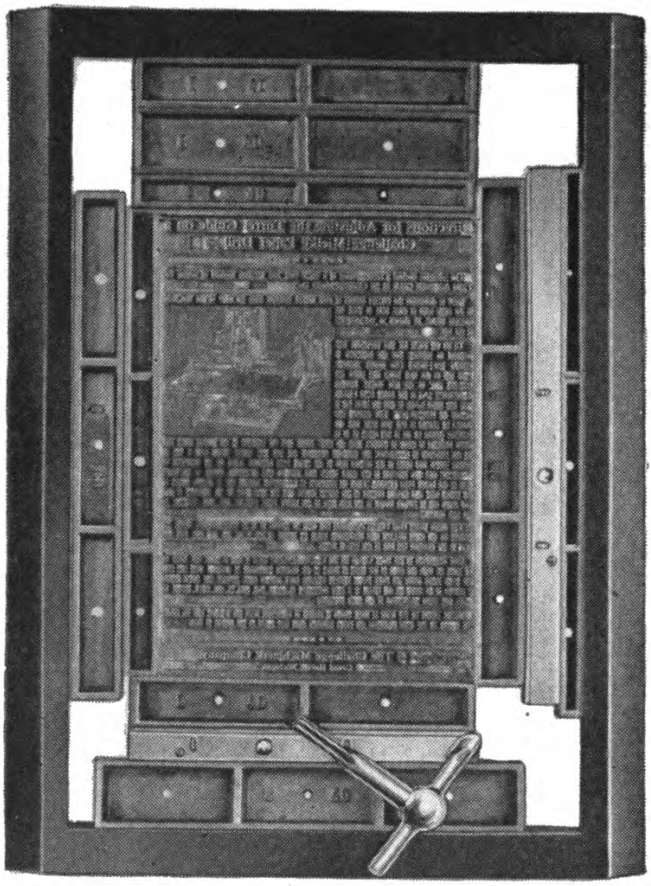


Figure 40.—A Challenge Hi-Speed quoin and quoin key in position in a chase.

Quoins are made of malleable iron, and come in two sizes. Modern Hempel quoins have locking screws.

REGLETS

Narrow strips of wood, used on both sides of quoins and inside the form, are known as REGLETS. They are inexpensive, and are available in various lengths. The standard widths are 6 points and 12 points. In an emergency, when you run short of spacing ma-

terial, you may also be able to use reglets to take the place of your regular lead and slug supply.

THE TYPE PLANER

Remember the planer you used in taking a proof? That was called a PROOF PLANER. Very similar to the proof planer, is the TYPE PLANER. About the only difference is that the proof planer has a felt-covered surface and the type planer doesn't. You'll be using the type planer to make the type surface of the form

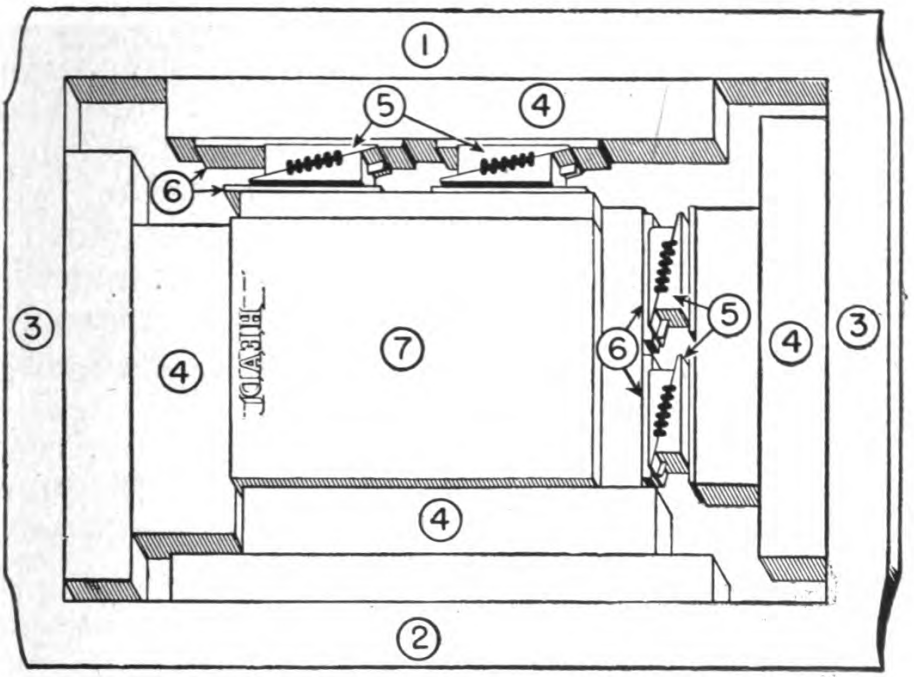


Figure 41.—Parts of the completed chase.
(1) Top of chase, (2) Bottom of chase, (3) Ends of chase, (4) Wood furniture, (5) Quoins, (6) Reglets, (7) Type form.

level. Here's how it works. You just set the planer on top of the type and tap it lightly with a wooden mallet. Don't hammer it too hard. If the type doesn't straighten out with gentle tapping, there is probably some dirt under part of it, or the form may be locked too tight. Be sure the surface of the planer is free from grit, too—or you might damage the type.

THE COMPLETED CHASE

That takes care of the most important materials you will be using in imposition and lock-up. The diagram in figure 41 shows how the completed chase looks. The parts that have been described are all labeled, so you can see where they fit into the overall picture.

WHAT YOU'LL DO AS A STONEMAN

After you've become familiar with the equipment you'll use as a stoneman, and have handled the various tools so you're sure you know how each of them works, you're ready to start the operation.

The first step is to study the job carefully. Before you even put the form in the chase, you must know all the details of how it will be printed. You'll have to know what size sheet it will be printed on, what the page size is, how the sheet is to be folded or stitched, what size press it will be run on, and what stock will be used. All of these factors may affect the imposition, so you'll have to check them all before you start.

When these details are firmly in mind, you're ready to slide the form off the galley and onto the stone. Be sure the stone is perfectly clean—grit on the stone may work into the form and cause you trouble. The procedure for transferring from galley to stone is the same as that described in the chapter on the composing room. Just be sure the form is tied securely, then tilt the galley and SLIDE the form onto the stone. A good rule to follow is: NEVER LIFT A FORM IF YOU CAN SLIDE IT. You'll save yourself a lot of trouble by remembering that. Look—no PI!

PUTTING THE FORM IN THE CHASE

Now you're ready to put the form in the chase. Choose a chase that will fit on the press you are going to use. For example, if you're going to run the job

on a 12 × 18 press, use a 12 × 18 chase—if an 8 × 12 press, you would use an 8 × 12 chase.

POSITION OF THE FORM

Ordinarily, the form should be locked so that the printing sheet will be in the center of the chase from left to right and slightly above center from top to bottom. This position makes it a little easier to feed sheets in the press. Place the head of the form toward either the left or the bottom, depending on the shape of the form. If the lines of type run the short way, the head should be at the left; if they are the long way, it should be at the bottom. By doing this, the head will always be toward what is known as the "feed edge" on the press and your presswork will be easier.

FITTING FURNITURE

When the form is placed in the chase, the next step is to put furniture around it. There's a trick to this. If you can find furniture the same length as the form, use that. But if you haven't any furniture that fits

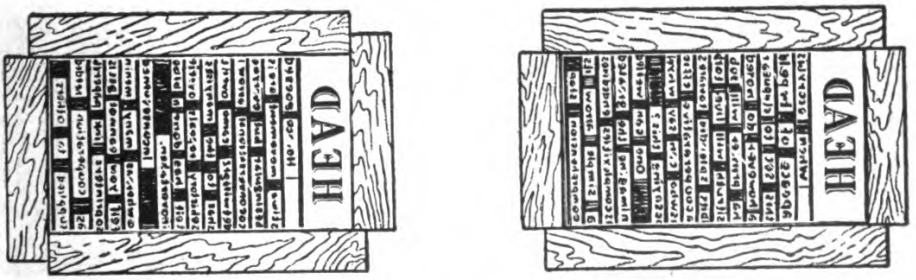


Figure 42.—How to overlap furniture.

exactly, use the next larger size and overlap it at the corners. Be sure that the furniture does not bind.

Fill in the necessary space at the left and bottom with more furniture. Then put furniture at the top and right but leave some space for quoins to be inserted so you can tighten the form. To fill in, always use furniture that is longer than that next to the form.

This will help spread the tension. Use reglets to fill in the narrow spaces.

Before you insert the quoins, remove the string around the type. You'll have to be very careful in doing this, or you'll mix up the type. Just detach the

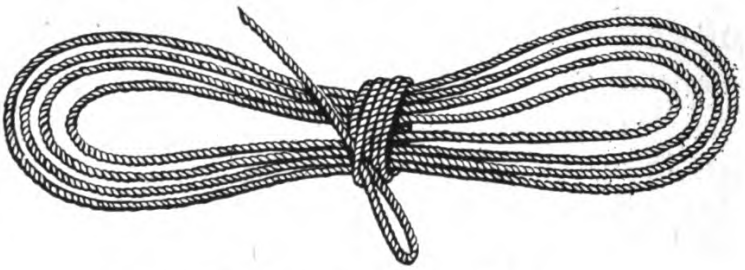


Figure 43.—String looped for future use.

loop, unwrap the string, and wind it around your left hand. Printers always save the string if it is in good condition, so they can use it again. The accepted method of looping string to be saved is shown in figure 43.

INSERTING THE QUOINS

After the string is removed, you can insert the quoins in the space you have provided at the top and right. If possible, put reglets on both sides of the quoins. If the quoin is against the edge of the chase —being metal against metal—it is apt to slip. Sometimes you'll find it necessary to put quoins at the bottom instead of at the top or right. For example, a large form might have to be put near the top of the chase because of the desired margins. But you can still lock the chase by using quoins at the bottom.

Note in figures 41 and 44 that the quoins are inserted so that the squeeze is induced toward the solid corners of the chase. Thus, the side quoins lock by turning the key clockwise; the bottom quoins, by turning counterclockwise.

Before you finally tighten the quoins, plane the form with the type planer and mallet. Never plane a locked form. But, before the form is locked, put the

planer on top of the type and tap lightly with the mallet to even up all the characters. If the characters are still not level after you've planed them, don't force them. Chances are there is dirt under the letters and you'll have to remove and clean them.

LOCKING THE FORM

Now lock the quoins firmly. When you use the wedge-shaped quoins, this is done by inserting the quoin key and tightening each quoin a little at a time. Don't tighten one quoin all the way and then try to tighten the others, because this will put all the pressure on the one you've locked first. Remember that just a partial turn will increase the tension, so don't force a quoin or you might wreck things.

TESTING

The next step is to test to see if you've done everything correctly. Testing is done by drawing the long side of the chase a little beyond the edge of the stone, raising it slightly by putting a quoin or quoin key under the edge and then pressing the form lightly with your fingertips to see that everything is locked securely. You can easily tell just by feeling the chase whether everything is secure or not. No matter how busy you are, you should never let a chase go out of your hands without first testing it. A loose form is almost sure to "pull out" when it is on the press and cause you a lot of trouble.

CLEAN-UP JOB

As a last step before releasing the chase to the pressroom, it is a good idea to wipe the back of the form with a clean rag and to scrub the type characters with a quick-drying type cleaner. Then the chase is ready to go to the pressroom.

All your good work so far can be undone if the chase is carelessly handled on the way to the press-

room. Heavy forms should be carried by two people or lifted by two persons onto a wheeled "donkey." Smaller forms which can be carried by one person should be handled with care and treated like a sheet of plate glass.

MULTIPLE FORM LOCK-UPS

The entire process described on the preceding pages involves only a single form in the chase. However, there are many occasions when you'll be putting two or more forms in the chase together, so they can be printed at the same time. For example, if you're going to print a circular on two sides, it is usually advisable to set both sides, put them in the form together and run them at the same time, then turn the sheets over and run them through on the other side. Imposition, lock-up, and handling are the same as for single forms, except that you will have two or more forms in the chase. Here are the most commonly used kinds of multiple form lock-ups.

TWO-UP METHOD OF LOCK-UP

At times you may be able to cut press time in half by setting two duplicate forms and putting them in the chase side by side. This is known as the TWO-UP METHOD. The sheets are printed in the same way as a single impression. Then they're cut in half and trimmed—and you'll have twice as many sheets as you would have for the same number of impressions of a single form. Lock-up is the same as for a single form, except that you may find you'll have to use more quoins. The same thing may be done with four separate forms. Then your chase will look something like the one shown in figure 44.

WORK-AND-TURN METHOD

When a sheet is to be printed on two sides you can sometimes use the WORK-AND-TURN method to advan-

tage. In this case you will set the type for both front and back and place them side by side in the chase. You'll have to allow double marginal space in the middle, but otherwise they are treated just about the same as a single form in lock-up. Then the sheets are run through the press and you'll have the front

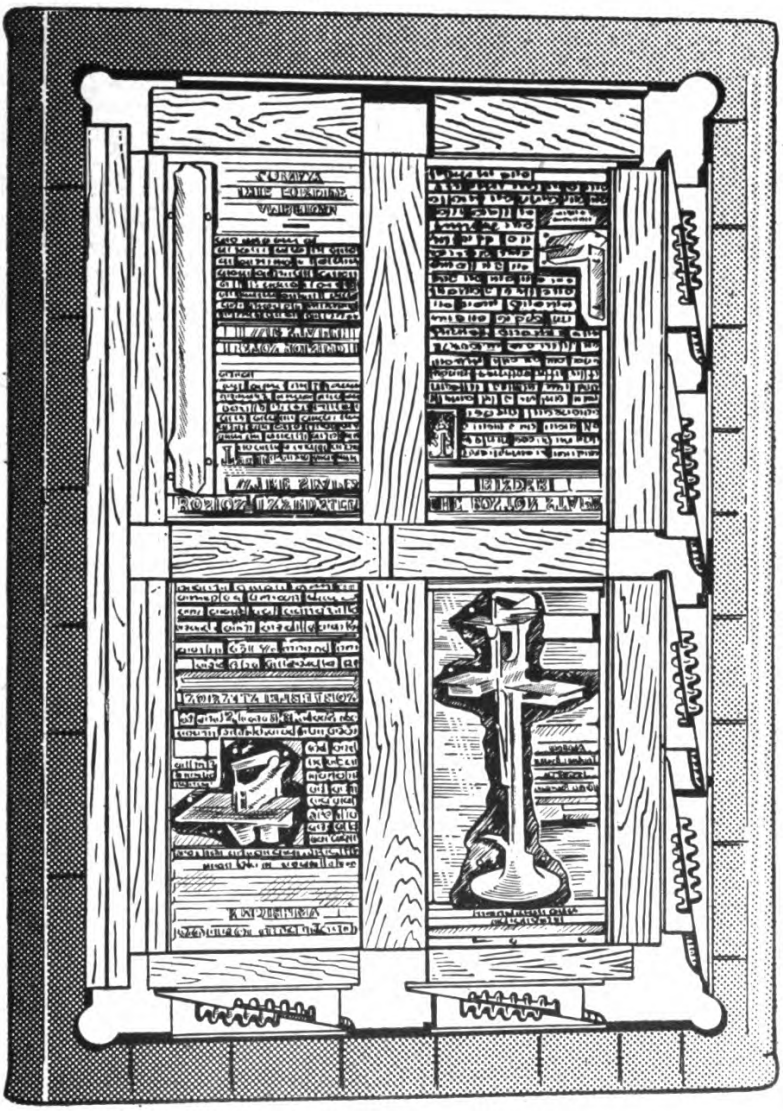


Figure 44.—Lock-up of four forms in one chase.

and back copy on the same side. Just run them through again, reversing the position of the paper so that the back form prints on the reverse of the front printed page and the front form prints on the reverse of the back printed page. Cut them in two, trim

them and you'll have a double quantity of two-sided circulars.

THE SHEETWISE METHOD

Somewhat similar to the work-and-turn method is that known as the SHEETWISE METHOD. This is used when you want to print two different pages on the reverse of the sheet. You put your two forms in the chase together, run one side of the sheets through the press, take the chase off and insert the other two type forms and run the other side of the sheets through. Result: A four-page job, with each page different, which can be trimmed and folded to make a four-page folder.

BOOK PAGE LOCK-UP

On large presses it is possible to run many forms together in the same chase and save a considerable amount of presswork. For example, in book printing, forms of 16 pages or 32 pages are commonly used. They can be printed together and cut and folded so that the pages will be in numerical sequence. Handling such large forms sounds complicated, but actually, if you just follow the same principles as for a single page form, you can't go wrong. If your imposition is made correctly and your forms locked up tightly with furniture and quoins, you can make up a 32-page form without too much trouble.

CHAPTER 7

MAINTENANCE OF THE PRINTING PRESS

KINDS OF PRESSES

The efficient operation of any machine depends upon maintenance. Take good care of a piece of machinery and it will turn out your work indefinitely. That goes for the engine in your post-war helicopter, your mother's sewing machine, or PRINTING PRESSES.

Maintenance requires a good general knowledge of the machine you're working with, however, and this chapter will help you acquire that knowledge about the most important machine in your life at the moment—the printing press.

Print shops are equipped with three different types —or kinds—of presses. The printing trade knows them as PLATEN presses, CYLINDER presses, and ROTARY presses.

As a NAVY printer, you will work almost exclusively with the platen press (until you make a higher rating) so, in this chapter, you will concentrate on that one. Before you do, though, here's a brief descrip-

tion of the various kinds of presses so that you'll know the difference in their operation. First, the—

PLATEN PRESS

There are probably more PLATEN PRESSES in use than any other kind. The platen press has been the workhorse of the printing industry—the "old reliable" on which practically all printers first learned the art of creating the printed page. Its name comes from the metal plate on which the paper rests as it swings forward to receive the impression. This plate is called

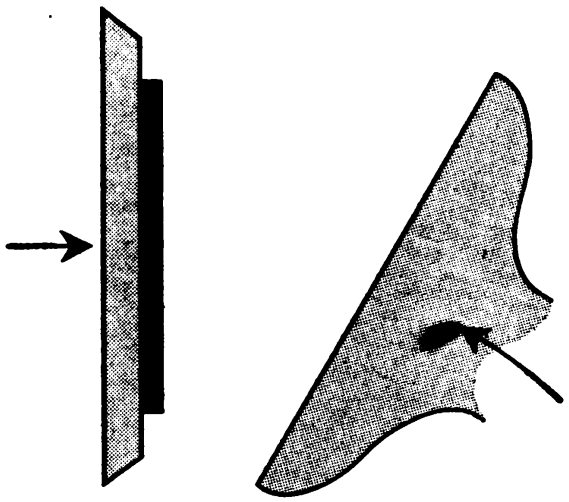


Figure 45.—Basic operation of the platen press.

a PLATEN. As shown in figure 45, all printing surfaces on a platen press are FLAT—the type form which makes the impression is flat, and the metal plate which receives the impression is flat also.

THE CYLINDER PRESS

Instead of operating with two flat surfaces, the CYLINDER PRESS operates with ONE CURVED surface and ONE FLAT surface. In this case, the flat surface is the type form; the curved surface is a revolving cylinder which presses the paper against the type to make the impression. The cylinder press possesses certain ad-

vantages over the platen press. In the first place, it is larger and can accommodate a much bigger sheet than

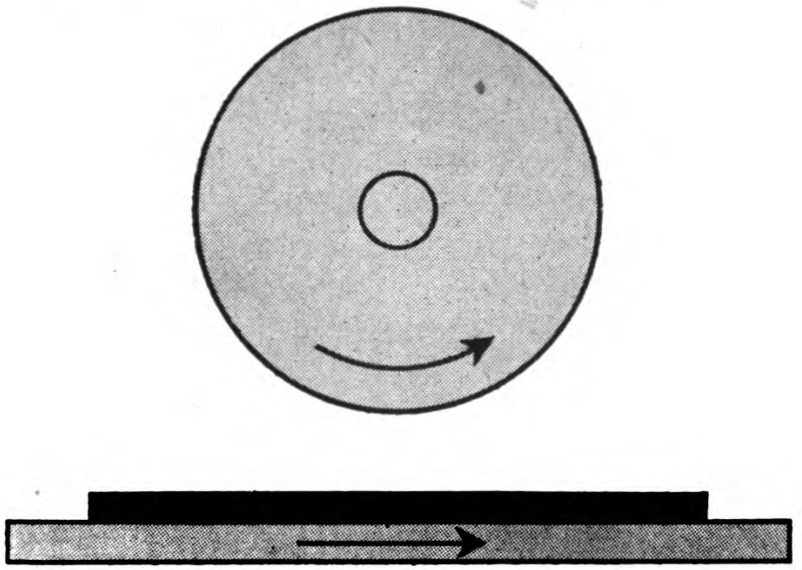


Figure 46.—Basic operation of the cylinder press.

the platen press. Also, because of the curve of the cylinder, a better impression can be secured.

THE ROTARY PRESS

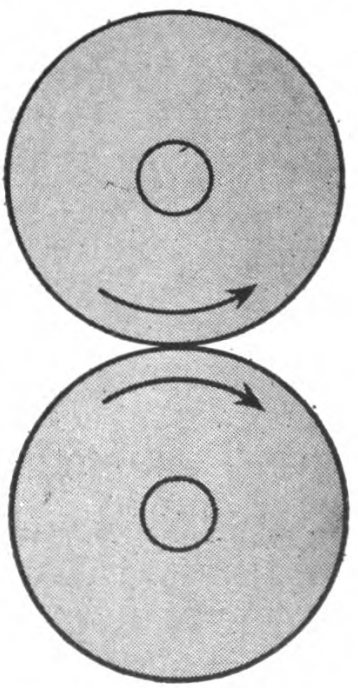


Figure 47.—Basic operation of the rotary press.

The ROTARY PRESS uses no flat surfaces in printing—both the type form and the plate which receives the impression are CURVED. You may wonder how the type form could be curved after we've gone into such detail on how it is made from type characters, leads, etc. The answer is that the original type form is not used on the rotary press. A STEREOTYPE or ELECTROTYPE, either of which is a duplicate of the original printing plate made by taking a cast from a matrix, is used. The stereotype or electrotype cast is made in the form of a curved plate.

PARTS OF THE PLATEN PRESS

Figure 48 shows a platen press with all the major parts labeled. Each of these parts will be discussed in detail, and you can refer back to this illustration after reading the description of each part. If you understand thoroughly how each part should work, you will be able to make minor repairs and keep the press in good working order.

As you know, the part from which this press gets its name is the PLATEN on which the paper rests to receive the impression. A CAM TRACK, which you'll see in the DRIVE GEAR at the right, controls the motion of the platen. The top surface of the platen is flat, to hold the paper; and the bottom part is curved to fit the PLATEN SHAFT. There is also a PROJECTION on the platen which acts as a counterbalance and serves to lock the platen at the time of the impression. Mechanics adjust the platen by turning FOUR SCREWS which are located on the under side.

THE INK DISK

The circular metal plate to which the ink is applied is known as the INK DISK. Ink is applied either by hand or by an ink fountain, and it is distributed evenly over the plate by the distributor roller which makes the contact with the fountain barrel. To aid in

this distribution, the disk revolves slightly with each impression.

THE INK FOUNTAIN

Many platen presses are equipped with an INK FOUNTAIN which automatically feeds the ink to the

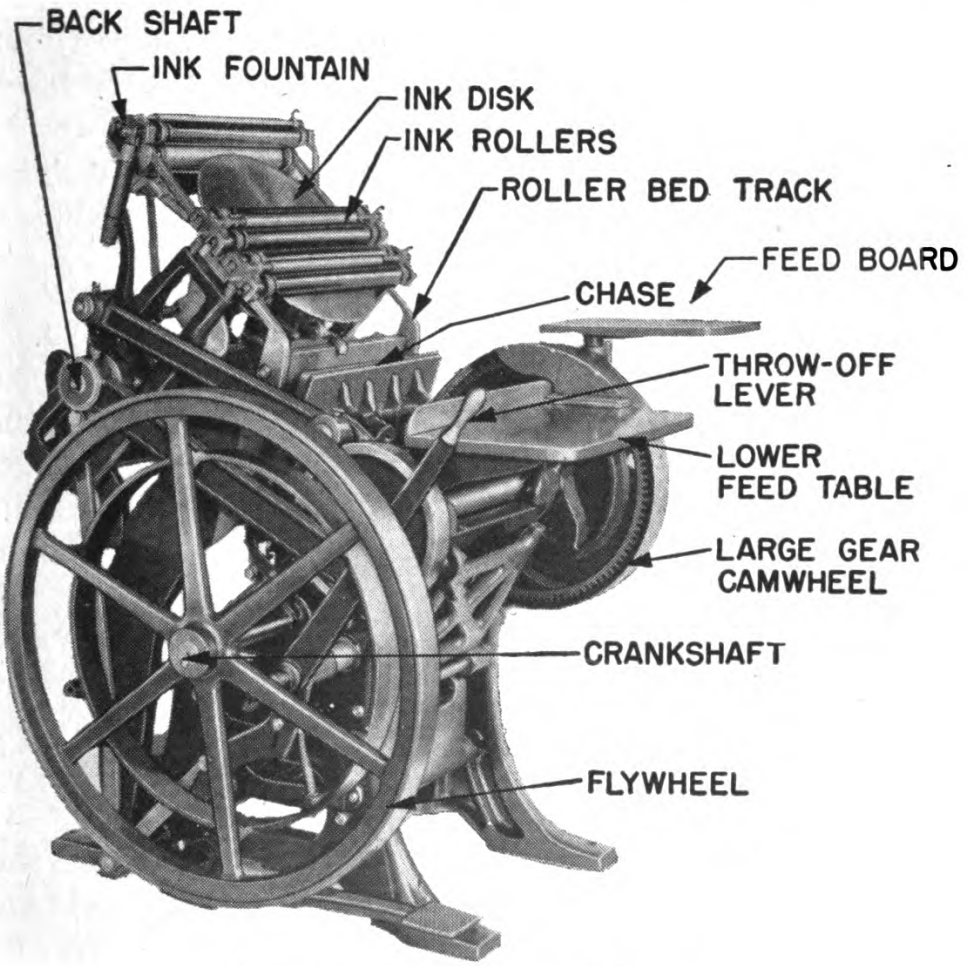


Figure 48.—Parts of the platen press.

disk while the press is in operation. It consists of a metal roller, called a FOUNTAIN BARREL, which turns against an adjustable blade—thus forming a trough to hold the ink. You can adjust thumbscrews at the back of the fountain to regulate the flow of ink from the fountain to the disk.

THE ROLLERS

After the ink has been supplied to the disk by the fountain, it is distributed over the surface of the disk by means of INK ROLLERS. These rollers are the same ones that swing down and ink the type form. Their movement is UP over the ink disk; then DOWN over the type form; then through the same process all over again. The rollers are supported at the ends by ROLLER TRUCKS, which fit into what are known as SADDLES. You'll find a section later on in this book which tells you how to take care of rollers. They're made of a composition consisting chiefly of glue and glycerin, and require careful handling if they are to be used successfully.

THE BED

The part of the platen press which holds the chase and type form on the press is known as the BED. This is a flat metal surface, directly opposite the platen and below the ink disk. It holds the chase by means of LUGS at the bottom and a CLAMP at the top. When the chase is in position on the bed, the rollers sweep over it and ink the face of the type in it. Then when the paper on the platen comes in contact with the type form an impression is made.

THE GRIPPERS

Printer's ink is sticky. When the paper hits the type it will stick right there—unless something is done to make sure that it will be lifted off again. That's what the GRIPPERS are for. They are metal rods which extend between the platen and the type form. When the platen comes up to the type form, these grippers close down over the margin of the sheet. When the platen moves away, the grippers momentarily hold the paper in place on the platen and prevent the sheet from sticking. You can adjust the grippers to the margins of the paper you are running through the press, so that they can be used on any size sheet.

THROW-OFF LEVER

In figure 48, on the left side of the press, you will see the THROW-OFF LEVER. This is used to skip impressions when necessary. When you push the lever forward (that is, away from you), the back part of the press is pushed away so that the TYPE FORM WILL NOT TOUCH THE PLATEN, even though the press continues in operation. When the lever is drawn back, the platen WILL touch, and you again get an impression. The lever is adjusted so that you can push it forward quickly and stop impressions whenever necessary—such as when a sheet of paper is put in the press incorrectly.

OTHER ACCESSORIES

The FOOT TREADLE is used, as you would expect, to operate the machine by foot power when the press is not run by a motor. Platen presses are either HAND FED or MACHINE FED. Practically the only difference is that in a hand-fed press you'll have to put each sheet in the press by hand; in a machine-fed press, the sheets are automatically picked up and fed into the press. Your press may also have a COUNTING DEVICE which registers the number of impressions taken, to help you count the run.

SAFETY FIRST

The press may also have other devices which are optional equipment and which include such things as brakes and other safety devices. Accessories that mean greater safety are, of course, good things to use—and if they are on your press, by all means use them. But the greatest safety device of all is YOU. Your own good sense is the best safeguard against accidents. Whether or not your clothes become tangled in the press, whether your hand gets caught between the platen and the chase, whether the press breaks down because you have failed to tighten the

chase—all depend on YOU. Use all the safety devices you can—but USE YOUR HEAD TOO!

PRESS MAINTENANCE

Before you actually get to the operation of the platen press, make sure you know how to handle it. After all, a printing press is a pretty intricate piece of machinery and you can't just step up, press a button and let it go. It's something like driving a car. Before you start on an auto trip, you check the oil, see that there is gasoline, look at the tires, and make sure that everything is in good running condition. The same sort of caution is necessary before you start to run a printing press.

OILING THE PRESS

Like any machine, your press must be kept properly lubricated. If run continuously, it should be oiled twice a day—and even if used only occasionally, it should be oiled thoroughly at least once a week. You will find that the oil holes are NOT located in the most accessible places. In fact, you'll have to look carefully to find them all—and you should be sure that you haven't skipped any.

Oil holes are apt to appear full when they are merely clogged with dirt—so you may have to clean some of them with a piece of wire before putting the oil in. After oiling, wipe the surfaces clean so that no oil will drop on the sheets you are running through the press. In most places you will use machine oil, but on the gears you will need a heavier lubricant.

CLEANING THE PRESS

Cleaning is an important part of press maintenance. You can't expect to get clean, first-class work from a dirty, badly kept press. So let's tackle the cleaning job step by step. If there is a type form on

the press, remove it. Then there are only two parts to clean—the INK DISK and the ROLLERS. Either gasoline or kerosene is used to clean the disk. Pour a small quantity on the disk, and wipe it off with a cloth. It will probably be necessary for you to repeat the process until the cleaning solution dissolves all the ink on the disk.

Then clean the rollers. Turn them to the top of the bed and clean the bottom roller first by rubbing it lengthwise with a cloth on which you've put some cleaning solution. Then move it down and clean the next roller in the same way. When all the rollers have been cleaned, run them down to the lowest position on the press. This method will keep the rollers in good condition for most purposes, but occasionally you should remove them from the press and give them a more thorough cleaning.

DON'T clean just the middle of the rollers and skip the ends. A lot of good rollers have been ruined because the ends became pitted from careless cleaning. And DON'T ever try to wipe the rollers while the press is running. You can't do it, and you're likely to wind up on the binnacle list if you try.

There's one special cleaning job with which you'll have to be extra careful. That's when you've been running a dark ink and you want to run a lighter color. Here's what to do then: After you've cleaned the press in the regular way, put a small amount of the light ink you're going to use on the disk, and run the press for a few minutes. The light ink will absorb the darker ink. Then you can clean the press again and you'll find that you can run a light color without having it darkened by the previous color.

FIRST AID FOR ROLLERS

As you've heard before, press rollers are extremely sensitive, and you'll have to handle them gently. They must be of a certain texture and be kept in the best of condition if you expect to get good impressions on

the press. That's why it is a good idea to keep them in a roller cabinet, similar to that shown in figure 49, where they will be protected from dust and dirt and the surface will be kept free of pressure.

Here's a "believe it or not" about rollers. You normally have to use entirely different rollers in summer, winter, spring, and fall. Here's why. Rollers are made principally of a composition of glue and glycerin. Rollers cast for winter use contain a greater proportion of glycerin than those cast for summer use, because more glycerin is needed to retain moisture when the air is cool and dry. You can't use winter rollers in the summer because they'd be too soft; nor can you use summer rollers in the winter because they'd be too hard. Rollers cast in the spring and fall are "in between," and may be used for the longest period of time. There are also rollers which are known as "all-weather" rollers and which can be used at any time. Obviously, these are ideal for use aboard ship when you may not be able to go ashore to get new rollers for months at a time.

Here's another peculiarity of rollers. Like apples or cheese, they have to be "ripened" or "seasoned." When rollers are first cast they are light green in color and are called "green" rollers. In this condition they will absorb the ink, and won't distribute it properly. So they have to be seasoned by coating them with oil or vaseline and letting them stand for several weeks. After this process you'll find they're light brown in color. Then they are ready for use.

HOW TO HELP ROLLERS LIVE TO A RIPE OLD AGE

When the press is not in operation, always turn the rollers to their lowest position. If you leave them against the disk or the type form, they will become flattened. And when you take them from the press, don't lay them flat—stand them on end so that the roller surface will not be damaged.

One of the big points in making rollers last is to keep them clean. Never allow ink to harden on them because you're liable to pit the surface in trying to remove it. Don't rub them too vigorously when cleaning them, and use a solution of half kerosene and half gasoline. This mixture won't affect the rollers. If the

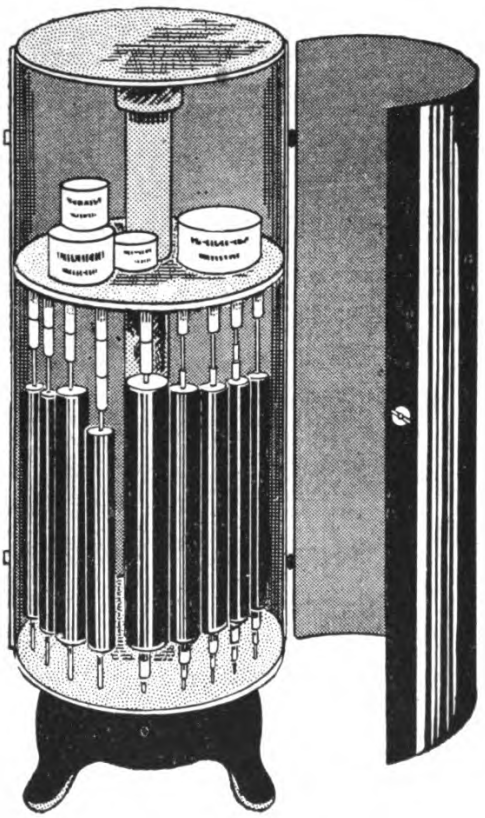
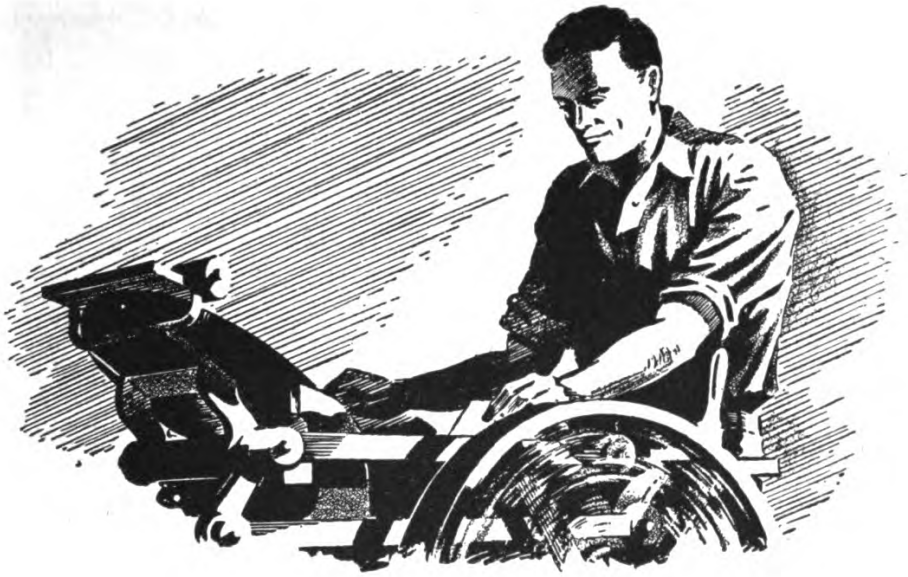


Figure 49.—A roller cabinet.

press hasn't been in use for a while, be sure the rollers are free from dust before you ink the press.

When inserting the chase in the press, be sure not to hit the rollers and put nicks in them. That's another reason why you should make sure the rollers are at bottom position before working on the press. And one last word—rollers are sensitive to HEAT. Never expose them to direct heat or sunshine. Try to keep them at a moderate temperature at all times.



CHAPTER 8

OPERATION OF THE PLATEN PRESS

PRESSWORK

Now comes the payoff in the printing operation. HERE'S WHERE YOU ACTUALLY DO SOME PRINTING. Assume that you're working with a platen press, and are going to use a type form like one of those you were considering previously. You have set the type, put it in the chase, locked it up, and cleaned the press preparatory to using it.

So now you can get started on your presswork. The first step is to ink the press. If the ink disk and rollers have been cleaned as already described, you're ready to go.

INKING THE PRESS

Inking should be done before the chase and type form are placed on the press, so the ink will be distributed properly before it is rolled over the type. If you are applying the ink by hand, use a SPATULA, and place the ink on the disk in small quantities. Then let the press run slowly for a few minutes so that

the rollers will spread the ink evenly over the disk. Of course, if your press is equipped with an ink fountain, you put the ink in that and regulate the flow, as has been described.

Naturally, the amount of ink you will have to put on depends on the size of the form. But, chances are, like most beginners you will put on too much ink the first time. A very small amount of ink goes a long way, so try putting the ink on in small quantities at first. Then you can build up the amount until you get exactly the right shade and tone. "Practice makes perfect" in this case.

You will also find it necessary to add ink during the press run (unless the press has an ink fountain). This ink can also be applied to the disk with a spatula. Put it on the upper left edge of the disk so that the rollers can distribute it over the disk before passing it over the form.

PUTTING THE FORM ON THE PRESS

Now you can put the type form on the press. Be sure the rollers are at their lowest position; then insert the chase against the beveled lugs at the bottom of the bed. Now raise the clamp at the top, put the chase to bed, and lower the clamp against the top of the chase.

You may work either from the front or the side when inserting the chase. If you have locked the form up properly, with the quoins at the top and right, the form should be placed on the press with the quoins in the same relative position.

As you can see, it is important that both the bed of the press and the back of the form be perfectly smooth. Otherwise the impression you get is liable to be uneven. As a matter of fact, you'll find it a good idea to go over the bed occasionally with a rag that has been saturated in gasoline, and then to apply a very thin film of lubricating oil. This will help keep the bed smooth at all times.

MAKE-READY

One of the most important parts of the printing process—that of equalizing the impression before the printing is started—is called MAKE-READY. You'll hear the term a lot in the print shop, so be sure you know what it means.

Make-ready is necessary to assure accurate printing. Many factors are involved in getting a good impression—the kind of ink used, the type and plates, the kind of paper, even the atmospheric conditions in the shop make a difference in the impression. All of these must be taken into consideration—and that's what you do in make-ready.

Biggest part of the make-ready job is the process of equalizing the impression before the printing of a job. Here's how it's done. First move the grippers to the outer edges of the platen (or remove them from the press) so that they won't affect the form during make-ready. Now you're ready to remove any make-ready paper (called "tympan") which may have been left on the press. Just raise the clamps at the top and bottom of the platen and peel off the paper that was used to obtain a good impression on the previous job. If the guide pins are still in, take them off too, and save them for future use.

PREPARING THE TYMPAN

The TYMPAN sounds as if it might be a musical instrument. But not in printing. Here "tympan" is the name given to the layers of paper which form a pad under the impression. You would find that if you just put the chase on and then ran paper through the press, there wouldn't be sufficient contact to make a good impression. So the platen, on which the paper rests, has to be built up to make a closer contact—and this is the main part of make-ready.

Usually the tympan consists of a sheet of pressboard and several sheets of ordinary paper, called the

PACKING; and a top sheet of heavy oiled manila paper, clamped down at top and bottom, called the DRAWSHEET.

Naturally, the thickness of the packing will depend on the job to be printed. On small forms you may find that two or three sheets of plain paper are sufficient. On large forms you will probably find that you need the pressboard and half a dozen more sheets. It's necessary to adjust the thickness, or SQUEEZE, for each job you are printing.

There's a difference in packings. Some are hard and some are soft. A form made up completely of type usually requires a soft packing—that is, one without the pressboard. But printing plates or heavy surfaces need a hard packing—one made by putting the pressboard above the paper, or made entirely from pressboard.

Never make the tympan any higher than necessary. Begin with a low packing which may give only a faint impression of the form; then build it up to the correct height for a good impression, and no farther.

When you think the packing is sufficiently high, start turning the press over by hand. See that the grippers clear the type or else they might injure the form. Without inserting any paper take the first impression on the drawsheet. This will show you the position of the form so that you can establish your margins and set your guides. (Naturally, you'll have to clean the drawsheet with a cloth dampened with gasoline or put a clean one on before starting the run.)

ESTABLISHING THE MARGINS

To establish the correct position of the paper, put a sheet of the stock over the impression on the drawsheet with the bottom of the sheet even with the lower edge of the impression. The space between the top of the impression and the top of the sheet will then represent your total (top plus bottom) margin. Mark this margin on the sheet of stock. Fold the sheet at

the total margin line. Then fold the margin space in half.

Now unfold the first fold you made, but mark the line where this fold had been. Place this first fold line at the bottom of the impression, and the second fold will give you your bottom margin space. Mark this space with a couple of dots on the drawsheet, draw a line between them, and you will have your bottom margin line. Do the same thing at the top and you will have your top margin. These lines are the positions by which you set your guides, which will hold the sheets in place while they are being printed.

Side margins are established in the same manner.

SETTING THE GUIDES

Now that you have found WHERE you want your sheets to hit, you next MAKE SURE that they hit in the

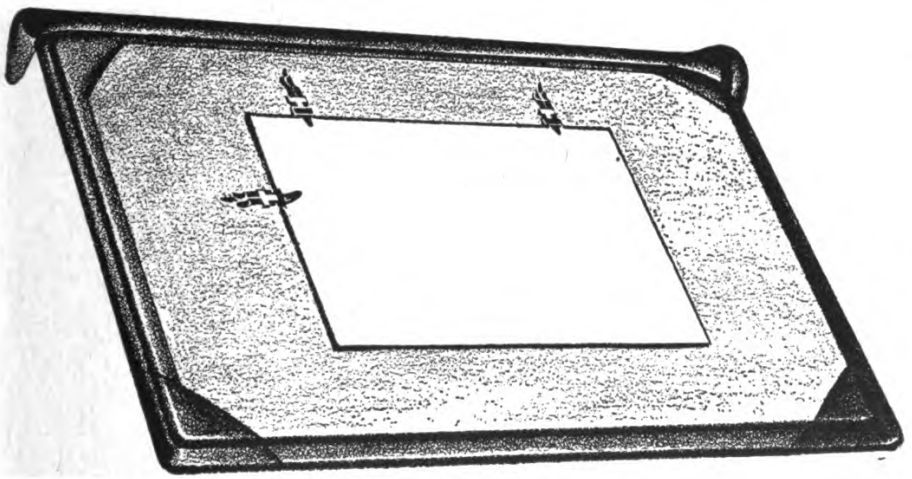


Figure 50.—Position of gage pins.

right place. This is done by means of guides called GAGE PINS. Usually you'll find that one of these pins is used on one side of the impression and two are used at another side, as shown in figure 50. You'll have to vary their positions somewhat according to the size of the sheet.

To insert the gage pins, just push the sharp points of the pins into the drawsheet a little BELOW the mar-

gin lines you have drawn. Then slide them down so that the shoulders of the pins are even with the lines. The lower ends of the gage pins are curved so that they will return above the surface of the tympan. This feature helps to prevent the guides from twisting or tipping.

OVERLAYS, UNDERLAYS AND CUTOUTS

If you ran a sheet through the press now, you would probably find that the biggest part of the impression could be read clearly; but that there were some spots in it which were too weak, and some spots which were darker than they should be. So you'll have to strengthen those parts which are weak and reduce the high spots to make the impression uniform. The building up process is done by either UNDERLAYING or OVERLAYING, and the reduction is done by CUTOUTS.

The difference between underlaying and overlaying is that UNDERLAYING is done on the BACK OF THE TYPE FORM, and OVERLAYING is done UNDER THE DRAWSHEET. Both are methods of patching to build up the contact between paper and type in order to get a good impression.

To underlay, first examine the trial impression to see where the weak spots are located. Then place thin slips of paper behind the type form in the corresponding places. Don't paste them on because then it will be hard to peel them off—just moisten the paper slightly and it will stick while you are clamping the chase in position. You'll find that a very thin piece of paper will make quite a difference in the pressure obtained and will strengthen the impression considerably. So, start off with just one piece of paper; you can build it up further if necessary.

An underlay is not considered quite as accurate as an overlay, so when fine detail printing is desired, you will usually make an overlay. Sometimes it is necessary to apply BOTH underlays and overlays, if the impression is extremely irregular.

In overlaying, remember that you build up the impression UNDER the drawsheet. If you are using a double drawsheet, the following is the usual procedure. Unclamp the top sheet and roll it down on the platen. Then take an impression on the under sheet. Then put the top sheet back in position and take an impression on that. By doing this you will have two impressions in exactly the same position, one on the top and one on the bottom drawsheet. Your overlay will go on the undersheet, not on the top drawsheet, because if it were on top it would interfere when the sheets are fed into the press.

Another method of overlaying is to use a SPOTSHEET, which is a regular printed sheet inserted under the drawsheet in the same position as the impression on the drawsheet. Take an impression on a sheet of the stock you are going to use, and build up the low parts to the required height by pasting thin sheets of paper on the spotsheet. Then register this sheet with the impression on the drawsheet by making two right-angle slits through the drawsheet at the upper corners of the impression. This will give you the location on the undersheet on which you can paste the printed sheet for exact register.

CUTOUTS are used to reduce spots that are too high. This is done by cutting holes in the sheet under the drawsheet so that the contact pressure won't be quite so great at these spots. On some forms you will find it necessary to make both underlays and overlays in certain spots, and cutouts in other places to equalize the impression.

CLEANING THE TYMPAN

After you have built the tympan up to the right height for a good impression, you should clean the tympan. This is done by putting a few drops of gasoline on a cloth and wiping the impression off the drawsheet. This is a necessary job and is done to

prevent getting a negative impression on the backs of the first few sheets you feed through the press. If the paper fails to feed properly and an impression is printed on the drawsheet while the run is being made, you'll again have to stop the press and clean the tympan.

SETTING THE GRIPPERS

The next step is to set the grippers. First, take a trial impression on a stock sheet. Leave this sheet in place; then put the right gripper over the right margin of the sheet and fasten it in place. Do the same with the left gripper. Sometimes it will be necessary to fasten a right-angle extension on the left gripper, so that it won't interfere with the left guide.

FEEDING THE PRESS

Probably the first press you operate will be HAND-FED. In other words, you will have to put each individual sheet in the press by hand, and then remove the sheet after the impression has been made.

How do you hand-feed a press? First place the sheets to be printed on the FEED BOARD, which you'll find at the right-hand side of the press. To make it easier to pick the sheets up, "fan" them out so that the top sheets hang a little over the others.

Your stance at the press is important, too. You'll probably find that the most comfortable position is directly in front of the press, with your weight resting lightly on the delivery board.

Now start the press. In starting, turn the flywheel forward by hand to relieve the starting strain on the motor. Until you have become proficient in feeding, it will be a good idea to run the press slowly so that you will have time to think about what you are doing.

The sheets to be printed are within easy reach of your right hand on the feed board. Grasp the top sheet firmly with the thumb and fingers of your RIGHT

hand. Put the sheet on the platen, resting it against the lower guides. Slide it to the left until it hits the left guide—then RELEASE IT IMMEDIATELY.

You'll have to watch out for a natural tendency to straighten out the sheet if it isn't exactly right when you put it in the press. DON'T DO IT. Never reach into the press to straighten out a sheet after you have first inserted it. The platen comes up to meet the type form quickly, and if your hand gets caught it's quite

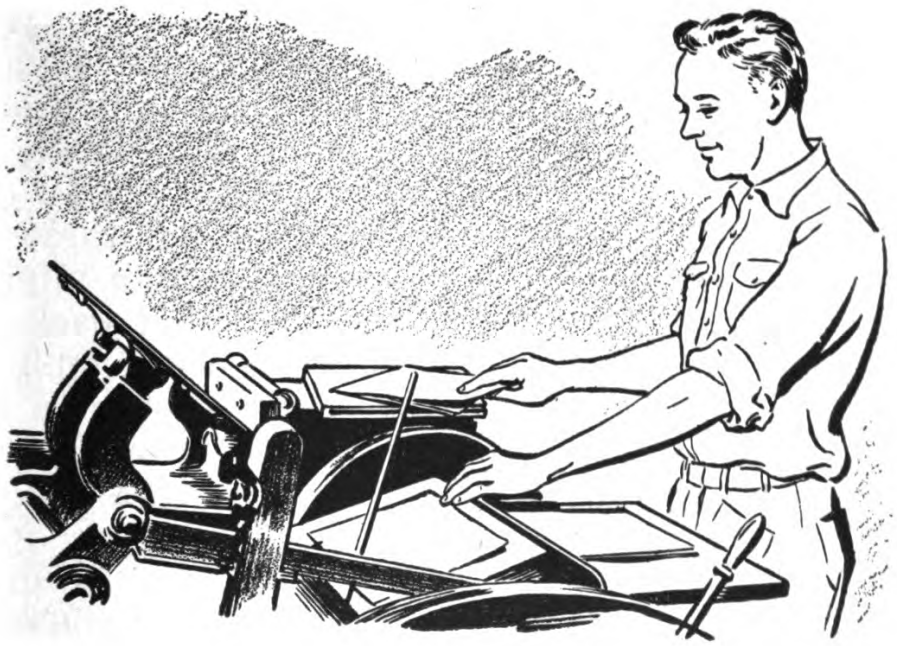


Figure 51.—Correct position for hand-feeding a platen press.

likely to be mashed to a pulp. It's far better to ruin one sheet and save your hand. NEVER touch the sheet after you once insert it.

While your right hand feeds the press, your LEFT hand removes the previously printed sheet from the press. Your left hand also operates the throw-off lever when necessary. You remove the printed sheets while the platen is moving away from the type form. SLIDE the sheet over the edge of the platen with your fingers; then grasp the bottom side with your thumb, and put the sheet on the delivery board right in front

of you. You'll have to be careful, because the ink is wet and, if you touch it, you'll make a smudge that will make it necessary to throw the sheet away. If the margins aren't wide enough and you have to touch the ink, you can use a sandpaper tip on your fingers to keep the printed sheet clean. And, of course, be sure your hands are clean before handling the sheet at all.

The left hand also operates the throw-off lever. This lever, as you know, is used to prevent an impression when you have failed to get a sheet into the press in time, or when the sheet is not in the correct position. If you fail to catch the throw-off in time, you'll get an impression on the drawsheet, and you'll have to stop and clean that before going ahead with the rest of the run.

The natural method of operating the throw-off lever is to push it forward (to PREVENT an impression) as the platen closes, and to pull it back (to MAKE an impression) as the platen opens. You'll get the proper timing after you have operated it a few times. And don't be afraid to use the throw-off lever as often as necessary. It's a safety device, and it's there to help you.

Timing is the big thing in rapid hand-feeding. You'll be slow at first—that's natural. But if you start out correctly, you'll soon find that you're gaining speed. And before long you'll be able to reach for a clean sheet, to put it in the press, and to take it off in one continuous motion.

AUTOMATIC PRESSES

Today you'll find that many platen presses have automatic feed units. Operating an automatic press is a cinch. The sheets are fed into the press by means of air suction, and are automatically delivered and jogged into place when printed. Automatics are faster than hand-fed presses and, because they eliminate the element of human error, are also more accurate. Some of them even operate a throw-off lever automatically,

when a sheet is not in exactly the right position or when no sheet is fed into the press.

About all you'll have to do to operate an automatic press is to watch it and see that nothing goes wrong. If something does go wrong, just remember that its basic principle of operation is exactly the same as a hand-fed machine. The parts are exactly the same, with the addition of the automatic unit. From the description of parts given in the preceding chapter you should be able to do any necessary trouble-shooting. If there's a relatively minor fault, you ought to be able to fix it.

CHAPTER 9

THE PAPER PICTURE

THAT'S HOW PAPER WAS BORN

Take a pot full of wood chips, add water, stir vigorously, cook for several hours and you've got—PAPER! Lots of folks think it's as simple as that. Don't try it in your ship's galley, though. You're liable to end up with a pot full of boiled wood chips on your hands—and an irate ship's cook on your neck—because there is really a lot more to the manufacture of paper than there appears to be.

Much of our paper has its beginning in the North woods, for the commonest paper stocks use wood as their base. This wood comes largely from the great spruce, hemlock, and fir forests in the northern part of the United States and Canada; but paper may also be made from a great many vegetable fibers, including corn stalks and flax and cotton. All of these are known as WOOD-PULP PAPERS. Better grades of paper, known as RAG PAPERS, are made—you guessed it—from rags. And some papers are made from a combination of wood fibers and rags. The latter are known as RAG CONTENT PAPERS.

You don't need to understand how to make paper, from wood pulp to magazine page, in order to be a good printer. But, because PAPER IS ONE OF THE MOST IMPORTANT TOOLS OF A PRINTER, you should know the basic story.

After the logs for paper-making have been floated down to the mills (as you have seen in newsreels and movies) they are stripped of bark and knots. Then they go into the "CHIPPER," where they are cut into

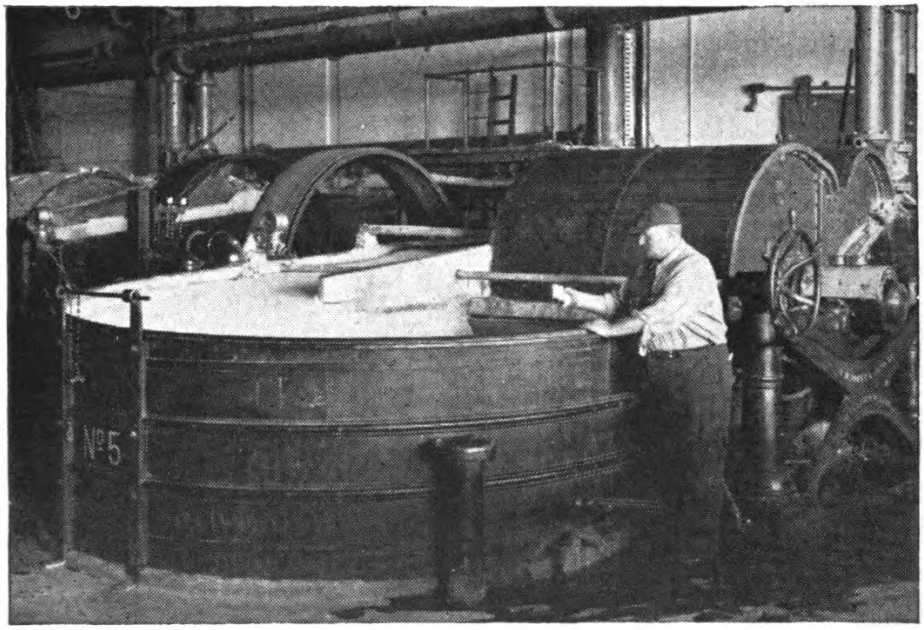


Figure 52.—A typical beater used in paper manufacture.

small pieces. After further screening to remove all dirt, they are stored until ready to be "digested."

The DIGESTERS are huge vats which act in some ways much like a human stomach. As you probably know, the hydrochloric acid in your system helps your stomach digest the food you eat. Similarly, the wood chips are cooked with acid and water in the digester. This dissolves all the rosin and other binding materials, leaving only the cellulose fiber called PULP. The pulp is then further washed, and is bleached in chloride of lime to whiten it.

THEN THE PULP REALLY TAKES A BEATING. It is put

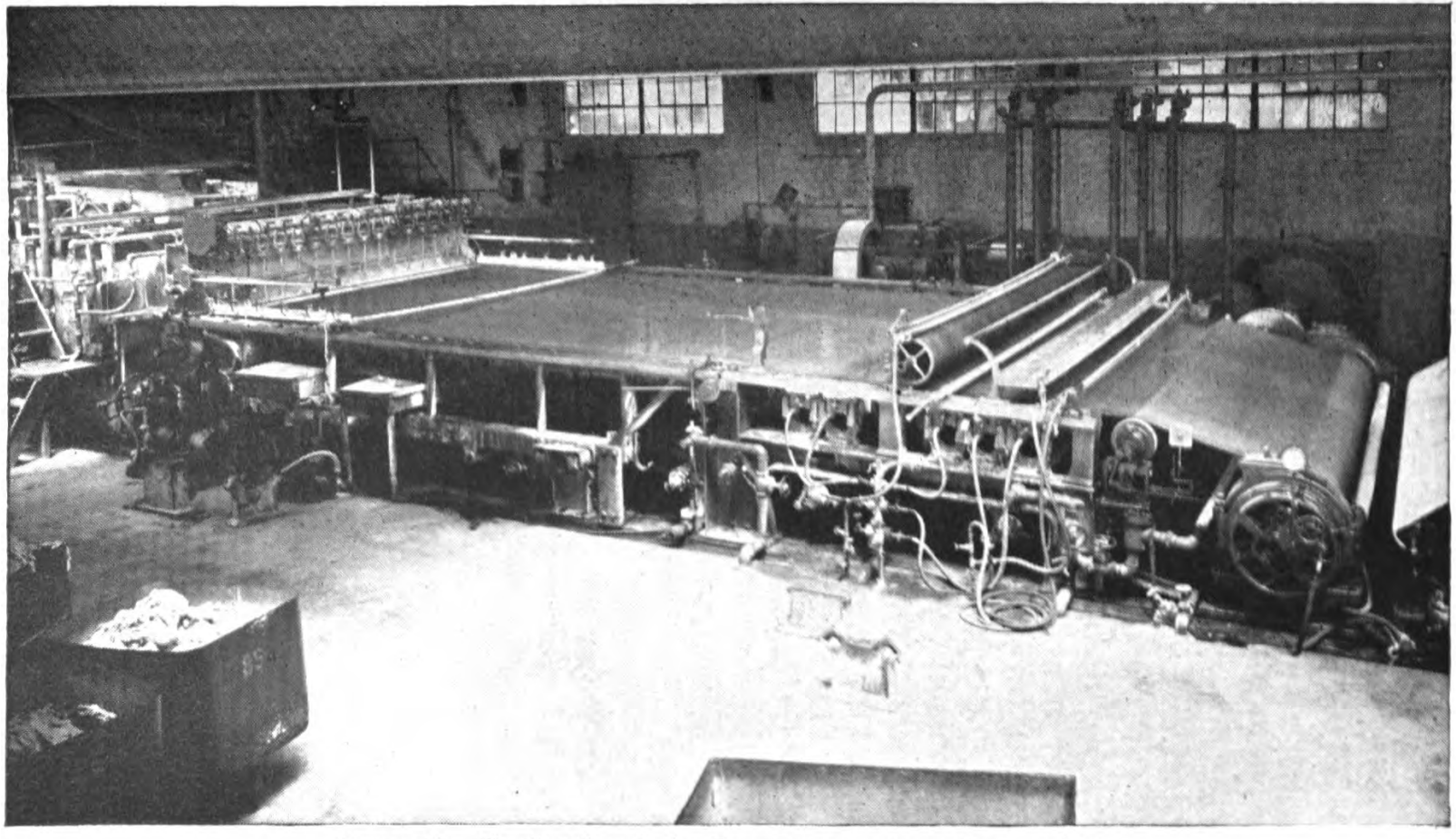


Figure 53.—The "wet" end of a Fourdrinier paper-making machine.

into pulp beaters, such as the one shown in figure 52, where it is mixed with water. Here the fibers are drawn out and separated; and if the paper is to be colored, the coloring material is added.

After being thoroughly beaten, the pulp is changed so much that paper makers even change its name. Now it's called STUFF, and is ready for the REFINING ENGINES. In these engines the stuff is beaten and whipped again, until its texture is perfectly smooth. Finally it is ready for the paper-making machine.

A paper-making machine is a fantastic looking device—but IT REALLY WORKS! It takes a spongy, wet, pulpy mixture in at one end; and it delivers dry, smooth, hard paper at the other!

This machine, shown in figure 53, is known as the FOURDRINIER. The pulp starts on its amazing journey through this gigantic contraption on a wire cloth screen. The water drains away as the screen passes through the machine, and finally the pulp forms a wet sheet—made up of millions of tiny fibers adhering closely together. Then heavy rollers hit the pulp and compress it; and steam-operated rollers apply heat to dry it. "Calender" rollers, at the end of the process, press the paper and give it the required finish. Then the paper is wound onto huge rolls at a speed of about five miles an hour.

KINDS OF PAPER

As you know, there is a great difference in papers. For example, the paper used in your morning newspaper differs greatly from that used by "The Saturday Evening Post"—or from that on which you write letters to the girl friend. In general, papers are divided into six classifications—NEWSPRINT, BOOK PAPERS, WRITING PAPERS, CARDBOARDS, COVER STOCK and MISCELLANEOUS PAPERS.

You know what NEWSPRINT looks like. It is the type of paper used in newspapers, cheap circulars and

bulletins; and it is generally made entirely from wood pulp. If you've ever tried to write on a newspaper, you know that NEWSPRINT STOCK DOES NOT MAKE A GOOD WRITING SURFACE. That's because it is too porous, and lacks the necessary filler and coating to provide a writing base.

But newsprint stock is perfectly satisfactory for its purpose. It will take coarse halftones (such as 55 or 65 screen); and it is inexpensive, so that huge quantities of it can be used in printing the daily papers. Newsprint comes in large rolls for use on rotary presses and in cut sheets for job and cylinder presses.

A similar paper used in print shops is POSTER. This is of the same quality as newsprint, but is available in colors. You may use it for booklets, posters, or economical circulars.

BOOK PAPERS

Probably the most commonly used paper in the print shop is BOOK PAPER. This is superior to newsprint in quality, and comes in many different types and grades —all the way from soft, porous paper to the finest grades of smooth, coated paper. Book papers are used not only in books but in practically ALL THE FORMS OF PRINTING YOU WILL BE DOING—circulars, catalogs, booklets, announcements, programs, etc.

The lowest-priced form of book paper is called MACHINE FINISH (or M. F.). This is a wood-pulp paper which contains very little filler or sizing. Although it is of higher quality than newsprint, it does not have a highly coated, smooth surface like some of the better grades of book paper. It is used chiefly in cheaper books, booklets, and circulars which do not need a "quality" look about them. Machine finish papers can take a coarse screen halftone. They do NOT take fine halftones, however. ENGLISH FINISH (or E. F.) papers are similar in quality to M. F.

A little better quality book paper is that known as SUPERCALENDERED (or S. C.). It has about the same

texture as machine finish, but has been sized (treated to prevent the absorption of ink) and calendered to give it a smoother finish. It will take finer halftones, and presents a better appearance than the cheaper papers. You'll use it on jobs where neatness and some brilliance is required, but where economy is also necessary. SIZED AND SUPERCALENDERED (S. & S. C.) paper is made and used like S. C., but is of a slightly higher quality.

Another form of book paper is called COATED or ENAMELED stock. This kind of paper provides the smooth, glossy finish you often see on quality printed jobs. Coated paper is also made in a dull, satiny finish which has an equally rich appearance. It has a wood-pulp base, but a clay filler is added to give it a heavier body and to close the pores. Then it is highly sized and calendered to give it an ultra-smooth finish. Both the glossy and dull finishes are EXCELLENT for HALFTONE WORK, and provide the best background for jobs requiring neatness, legibility, and a smart appearance.

Then there's another form of book paper which is purposely made soft and porous. This is known as PAMPHLET or EGGSHELL. It is usually used for books and other printed jobs which require NO HALFTONE ILLUSTRATIONS. OFFSET PAPERS, used in offset printing, are similar to this, but can take photographic illustrations.

WRITING PAPERS

Entirely different both in texture and use are those kinds of paper which fall under the heading of WRITING PAPER. You're familiar with writing paper because it is the kind of paper in your writing kit. It's made to take writing—either pen or pencil—AND printing.

BOND PAPER can be made from 100 per cent wood pulp, in which case it is known as SULPHITE BOND; or it can have 100 per cent RAG CONTENT, which makes it

a finer, longer-lasting and more expensive paper. It can also be made with varying amounts of wood and rag filler, in which cases it goes by the PERCENTAGE of rag content. To make it suitable for taking ink writing, it is woven firmly and given a good coat of sizing. Bond is the usual thing to use for printing letterheads, bill heads, ruled forms, and any other commercial forms which will eventually be used for writing purposes. It will take line engravings but not halftones.

LEDGER PAPER is similar to bond except that it is heavier and is given even more sizing. This makes it suitable for records, official documents, contracts, etc. MILLS or FLATS are sulphite papers which are used in notebooks and school children's composition books. They resemble the calendered papers used in cheaper magazines, and are generally suitable only for pencil writing.

CARDBOARDS

There will be some occasions when you will be using CARDBOARDS in the print shop. You'll find that there are three main classes—BINDER'S BOARDS, COATED BLANKS, and INDEX BRISTOLS. Binder's boards are those used for binding books. Coated blanks have a smooth, hard finish (sometimes enameled) and are used for posters, window cards, tickets, etc. Index Bristols have a hard, bond finish, suitable for writing purposes. They are the cardboards you will use for card blanks and filing records.

COVER STOCKS

Paper manufacturers exercise plenty of ingenuity in developing cover stocks. You'll find some that look like leather, some that look like gold, and some that look like cloth. You'll even find some that look like paper! They are intended as covers for booklets, bulletins and catalogs of all kinds. Usually they add WEIGHT AND BODY to a booklet, and are used to DRESS IT UP OR TO MAKE IT MORE DURABLE.

MISCELLANEOUS PAPERS

There are other kinds of papers for which you will find some use in your print shop. You'll use GUMMED PAPER for labels and stickers. Modern gummings are so highly developed that you can print gummed papers easily, with just a little extra care on the presses.

You may have occasion to print some of the very light weight papers—ONION SKIN, BIBLE, or TISSUE PAPER. Here again you'll have to use a little caution in handling them because of their extremely light weight. And once in a while you may have to print on BLOTTING PAPER—either plain or coated.

SIZES AND WEIGHTS OF PAPER

As you will see when you get into figuring paper stock, SIZE is a very important factor in selecting paper. Jobs of certain sizes will cut perfectly from one standard sheet, but will result in great waste if cut from another standard size sheet. That's why manufacturers offer you several sizes to choose from in buying each kind of paper.

The tendency of paper manufacturers now is to concentrate on a smaller number of regular sizes of paper. You'll find these listed in all paper catalogs and literature put out by paper manufacturers. Book paper, for example, usually comes in 17 × 28, 25 × 38, 28 × 44, 35 × 45 and 38 × 50 inch size. Bonds, ledgers, and flats usually come in 8½ × 11, 17 × 22, 17 × 28, 22 × 34 and 28 × 34 inch sizes.

SUBSTANCE WEIGHT is usually given after the size in a paper catalog, and refers to the actual weight of 1,000 sheets of the stock. For example, 25 × 38–100 means that 1,000 sheets of this paper, in a size 25 × 38 inches, weigh 100 pounds. If 1,000 sheets weigh 40 pounds, the paper is referred to as "Substance 40" or "40-pound stock"; if it weighs 16 pounds, it is "Substance 16" or "16-pound stock."

CHAPTER 10

PAPER HANDLING IN THE PRINT SHOP

PAPER CUTTING

Your kid sister may be an expert at cutting out paper dolls—but don't let her tell you that qualifies her as a paper cutter in a print shop. This is one of the most exacting jobs in the shop, and you'll find that it is given only to experienced hands.

One look at the type of paper-cutter used in most print shops and you'll see why. It has a blade that's big enough and sharp enough to cut through a stack of New York telephone directories—and it could slice off your right hand just as easily.

That's why you have to KNOW the "ins and outs" of this machine before you are allowed to handle it. Nobody wants you to lose a hand or a finger—and nobody wants you to spoil a few thousand sheets of expensive paper. You won't do either if you're CAREFUL and ACCURATE when you're operating a paper-cutter.

PAPER-CUTTERS are either hand-operated or motor-driven. With either kind, the principle is the same.

Most paper-cutters used today are power-operated, however. The power-cutter is simple to operate, but it requires concentrated attention if you want to avoid mistakes and errors. First you have to set the gage—a mechanism in the rear of the cutter which moves forward or back to hold the paper in position. You move it by turning a small wheel at the front of the cutter. This wheel, which you can see in figure 54, is usually graduated in inches. You set it at the dimension you want, and the back guide moves to the correct position.

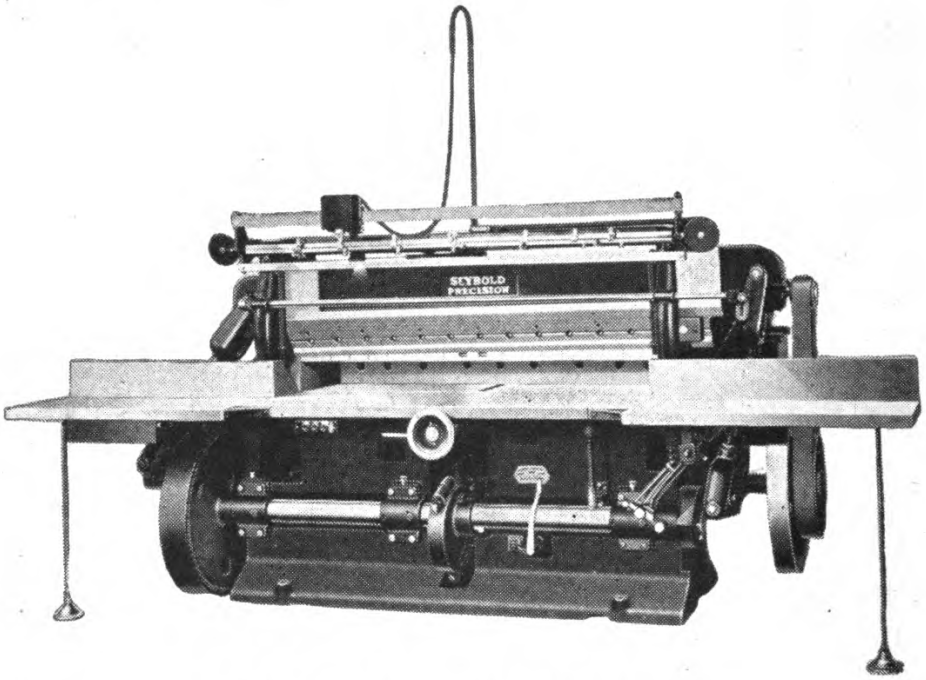


Figure 54.—A power-driven paper-cutter.

The next step is to put the paper in position on the cutter table. There are a few points you must always watch, but if you follow them closely, you'll find it hard to go wrong. ALWAYS jog the paper frequently and see that it is even on all sides. ALWAYS push the paper back all the way—until it rests snug against the back gage. ALWAYS put a sheet of cardboard on the top and bottom of the pile, to insure an even cut and to prevent the paper from being creased by the clamp.

If you've checked these three steps you're ready to do the actual cutting.

In a power-cutter you just trip the starter and the knife drops down through your stack of paper as if it were made of butter. With a hand-operated machine you have to pull down a lever, and this pulls the blade down with it. Steady does it. Use a firm, even pull—not a choppy motion.

When cutting paper you should allow a little extra stock for SPOILAGE in make-ready and printing. Some extra stock is always necessary because sheets are used in preparing the press, setting the guides, regulating the flow of ink, etc. In addition, some sheets will always be spoiled in printing. When paper does not cut evenly from stock sheets, it is a good idea to cut the print-size sheets slightly larger than final size. They can then be given a final trim after they are printed.

FOLDING

Many of the jobs you will be printing will have to be folded—and it is entirely possible that you may have to do the folding yourself. So you'll need to be familiar with METHODS OF FOLDING—both by HAND and ON A FOLDING MACHINE.

Folding in the print shop is a little more complicated than folding a few sheets of letter paper. First of all, there are many different kinds of folds. Some of the more important are shown in figure 55. These probably are the ones you will be using most frequently.

Folding can be done by hand if the job isn't too big and the fold is a simple one. For a simple fold, such as in programs or pamphlets that are folded only once, bring the edges of the sheet together, make sure they are even, then crease the sheet sharply in the center. You can make a good hard fold in ordinary paper stock with a BONE or HARDWOOD FOLDER. Heavier stock, such as cardboard, should be SCORED ON THE

PRESS before going to the bindery. For more intricate folds it is usually a good idea to score a fine line where the fold will be, as a guide to the folding.

If a power-driven folding machine is to be used,

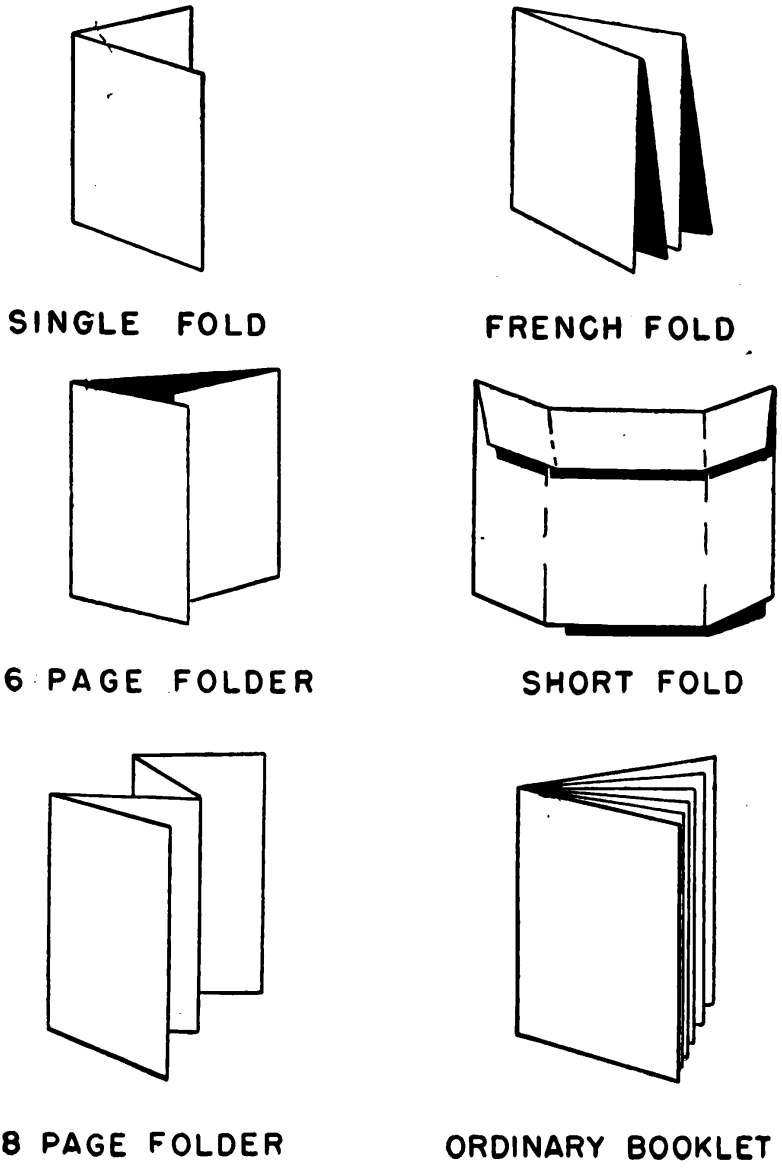


Figure 55.—Various types of folds.

even greater care must be taken—both in the actual folding and in the preparation for the folding machine. Most machine folding involves sheets laid out as SIGNATURES. This kind of signature has noth-

ing to do with signing your John Hancock. It is a term used in the pressroom, and one you'll be hearing a lot.

A signature consists of a single sheet on which a number of pages are printed. It may contain 8, 16, 32, or more pages (in multiples of 8), but they are all printed on the same large sheet. The number of pages which can be printed on one sheet varies, of course, with the size of the page, the equipment, and the size of the stock. But, whatever the size, when the sheet is printed it is fed into the folding machine as a complete unit. The point is this: THE LARGER THE SIGNATURE, THE GREATER THE ECONOMY, under ordinary conditions. It is a good rule to remember and follow when you are printing jobs that have a large number of pages.

The operation of a folding machine is almost fully automatic. When properly set, you merely insert the flat sheets at one end and they come out the other end correctly folded. But there are a few things you should know about the folding process which will help make you a better operator.

The edge of the sheet which enters the folding machine first is called the guide or gage edge. The edge which is called a side guide on the printing press is known as the folder head guide on the folder.

In folding a booklet you will have to watch out for a bulge at the back (called a "fold-around") and an uneven protrusion at the fore edge (called the "outpush"). To overcome these it is a good idea to make a dummy of the exact number of pages and on the kind of stock you will be using even before printing the job. In this way, you can position the type form to allow for both fold-around and outpush.

BINDING

After a job is folded, your next step is BINDING, if the job calls for it. This can be done in any of many different ways, and can be as simple or as elaborate as

the job requires. You're not talking, however, of regular book binding. That's a special art in itself. The kind of binding described here is similar to that which is done in almost any print shop.

STAPLING

Small booklets can be STAPLED. The operation of a

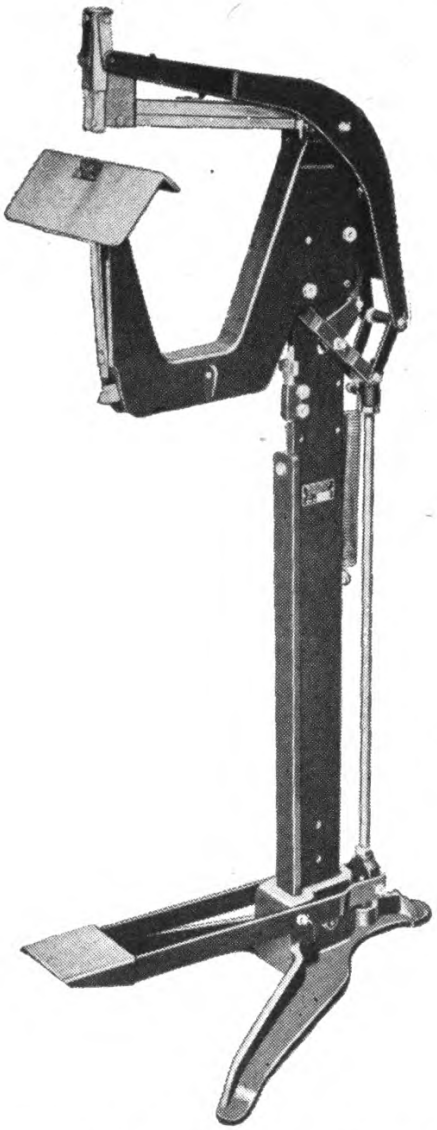


Figure 56.—A typical stapling machine.

stapler in a print shop is similar to that of a small hand stapler you have probably used frequently—except that the print-shop type is usually operated by

foot, like a sewing machine. Booklets may be either SADDLE STAPLED (along the fold) or SIDE STAPLED (along the side). The staples come in strips—like the clips in a machine gun—and are inserted in the back of the machine. Then they are automatically pushed forward, separated, and driven through the paper when you step on the foot pedal. In large shops, power-operated staplers are sometimes used; but, chances are, you won't be operating them for a while.

WIRE STITCHING

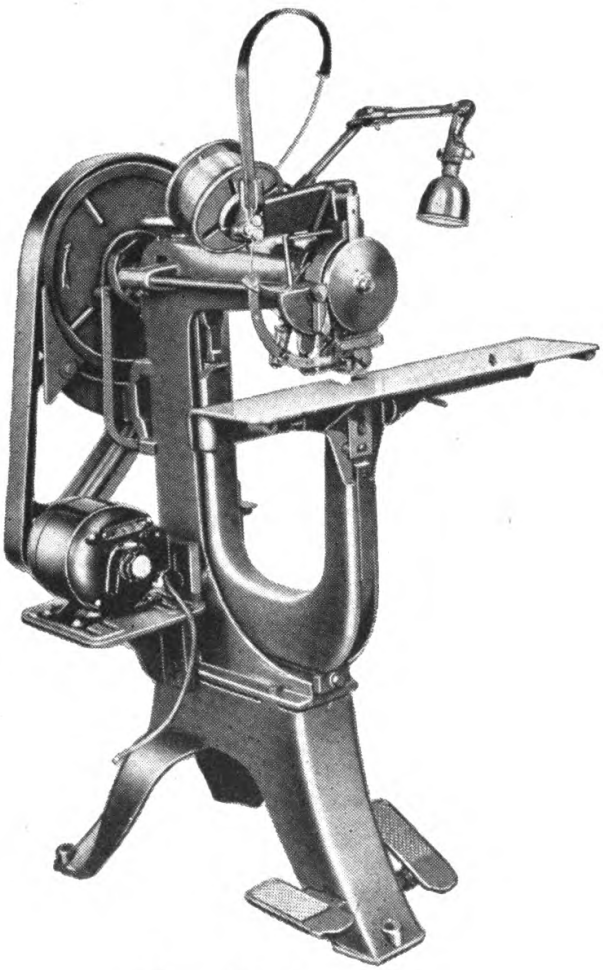


Figure 57.—A wire stitcher.

The WIRE STITCHER shown in figure 57 is similar in operation to a stapler. But the wire in a stitcher

comes in the form of a ROLL—not as individual staples. This permits you to adjust the length of the staple to the thickness of the paper. And because the stitcher is usually faster in operation than the stapler, it is considered more suitable for use in shops where much stapling is to be done.

There are guides on the stitcher which can be set for the correct spacing of the staples. You can also pre-set the proper length of the staples by trying a few practice runs with the machine. In actual operation, the staples are inserted by pressing the foot pedal as the booklets you're stitching are run through the machine.

As you can see, this is another print shop operation which can result in painful injury. It's easy enough to get your finger caught in the stitcher—and remember, you WON'T get the Purple Heart for this kind of injury. This is one more spot where it pays to keep your mind on the job.

BINDING WITH CORD

Another method of binding—used where the thickness is too great for either stapling or stitching—is TYING WITH STRING or HEAVY CORD. To do this, it is first necessary to punch three holes in the binding edge of the sheets. One hole is at the center and the other two are near the ends. Thread the cord DOWN through the center hole, UP through one of the end holes, DOWN through the other end hole and UP again through the center hole, as shown in figure 58. This will bring the two ends together again around the cross cord so they can be tied securely and the sheets kept together.

PADDING

The process of making pads or tablets by cementing the edges of the sheets is called PADDING or TABBING. You know what these pads are—you've used them as

scratch paper pads or writing tablets. Here's how they're made. The sheets are separated into piles of the number of sheets desired, and a piece of cardboard is put on the bottom of each. Then you stack several of them, jog them even all around and put them on a table with the end to be padded facing you. It is usually a good idea to put a heavy weight on the pile, or to clamp it down in some way. Then you're ready to apply the cement.

Padding cement is used for this purpose—and you'll find it available wherever this kind of work is done. One coat is applied and left to dry; then a second, and

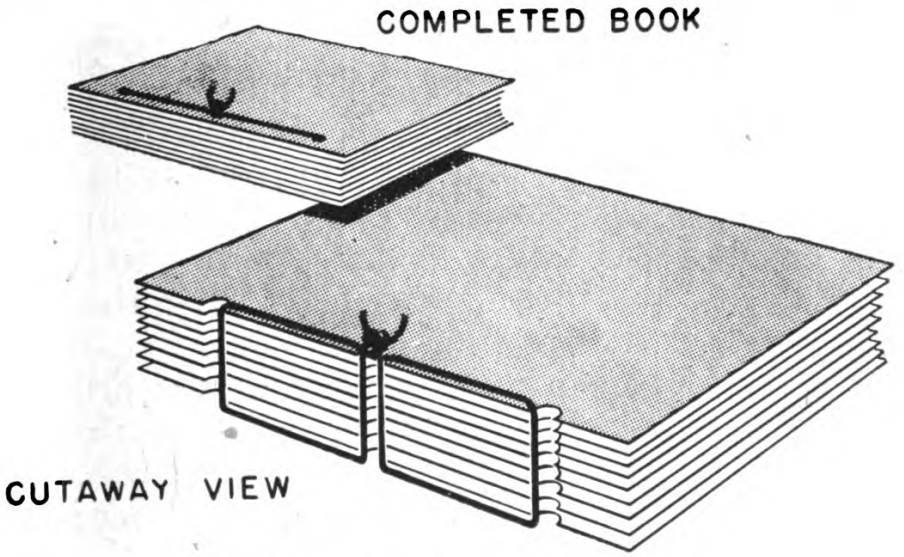


Figure 58.—Method of tying with cord.

usually a third coat is applied after the preceding coats have hardened. To strengthen the padding, a piece of thin gauze or mosquito netting is usually put on between the coats of cement.

After the pads are dry, they can be trimmed on three sides and separated into individual pads with the cardboard on the bottom of each.

PUNCHING

It is also sometimes necessary to PUNCH paper, and that is also a function of the bindery. Punches are

available in both hand- and foot-power models; but in some large shops you'll find them replaced by a PAPER DRILL, which is capable of boring through large stacks of paper. The operation of punches is simple enough after the preliminary adjustments have been made. First you select the proper size of punches or dies, and attach or adjust them for the specified distance between holes. When the location of the holes has been determined the guides are locked in place by means of set-screws. Then the holes are made in the paper by the operation of a hand lever or foot pedal which lowers the punch.

PERFORATING

Coupons, such as you find at the bottom of an advertisement or circular, are usually PERFORATED. That is, the sheet is pierced with a series of tiny holes or slits so it will be easy for you to tear off the coupon.

You may have occasion to do some of this work; and you'll find that it can be done either on the press with a PERFORATING RULE, or in the bindery by means of a hand- or foot-operated PERFORATOR. The ordinary bindery perforator consists of a machine with a die and a series of blunt pins (which fit into the die when the machine is operated). You insert the paper in the perforator, pull down a lever, or step on the foot pedal, and the pins come down and punch a row of tiny holes in the paper.

CHAPTER 11

MATHEMATICS FOR THE PRINTER

SHORT CUTS

This chapter isn't about the kind of arithmetic you had in school. It's practical stuff that you'll use every day in the print shop. You'll probably find this chapter pretty interesting, because it shows you mathematical SHORT CUTS that will help you make quick, standard calculations to cover all sorts of cases. There's the dope on the method used in composing rooms to figure type measurements, for instance. There's another section that will make it easy for you to estimate the amount of paper to be used on the job. There's the system used in finding out how much TYPE will fit in a given amount of space—and another system to help you determine how much SPACE a given amount of type will occupy.

THE POINT SYSTEM

The system you will probably be using most frequently is THE POINT SYSTEM. It is used to measure all sizes of type, lengths of lines and dimensions of jobs.

In this system the basic unit of measurement is

the POINT, which is approximately 1/72 inch or, more accurately, .01384 inch. That's pretty small, as you can see, so it is used only to indicate the size of type characters and other composing room material.

The next largest unit is the NONPAREIL which is equal to 6 points or 1/12 inch. And the next—which you'll probably use more than any of the others—is the PICA. This is the equivalent of 12 points (2 nonpareils or 1/6 inch).

Putting them in table form, so you can memorize them more easily, you get this:

MEASUREMENT	IN INCHES	IN POINTS	IN NONPAREILS
1 Point	1/72 Inch	.....	.....
1 Nonpareil ..	1/12 Inch	6 Points ...	.....
1 Pica	1/6 Inch	12 Points ...	2 Nonpareils.
6 Picas	1 Inch	72 Points ...	12 Nonpareils.

Figure 59.—The point system.

TYPE SIZES

Type size is always measured in points. You may be setting a job in "8 point type, with a 12 point head," for example. That means the main BODY type is what is called 8 point, and the HEADING is slightly larger, or 12 point type. To show you the difference, here are some lines set in different sizes:

This line is set in 6 point Bodoni

This line is set in 8 point Bodoni

This line is in 10 point Bodoni

This line is in 12 point Bodoni

This is 14 point Bodoni

This is 30 point Bodoni

72 point Bodoni

Individual type faces are always measured from front to back—that is from the NICK side, as shown in figure 60, to the back.

This illustration also shows some of the other parts of the TYPE CHARACTER. For example, the FACE is the

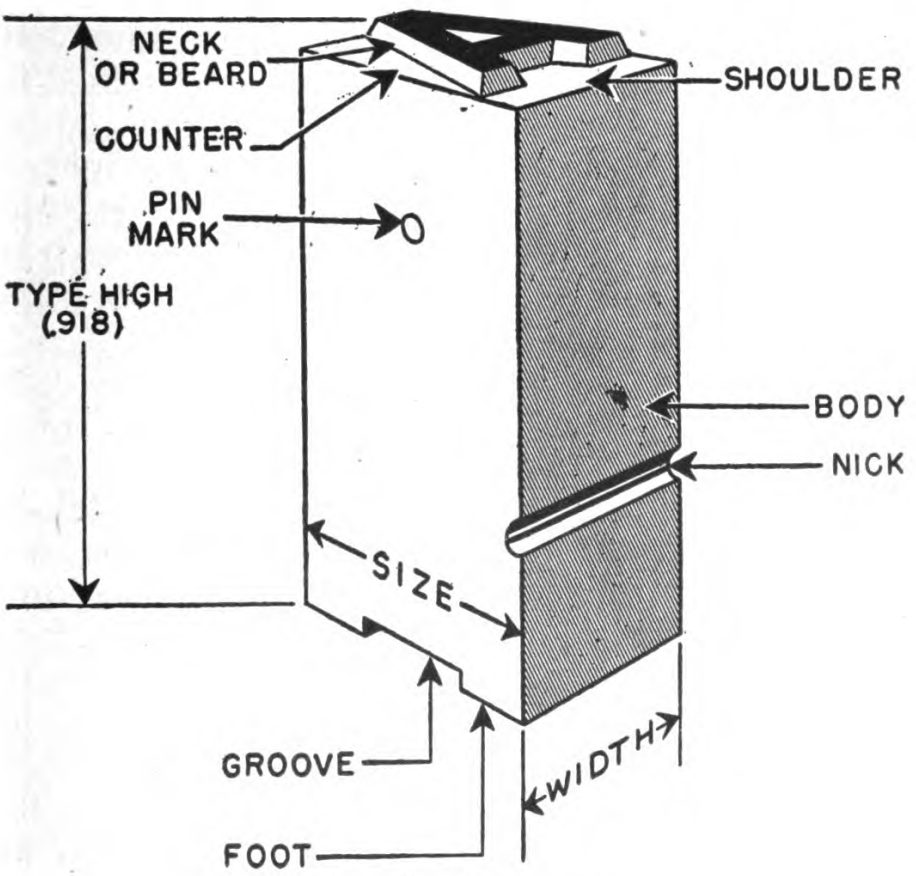


Figure 60.—Type terms.

printing surface at the top of the character; the SHOULDER is the blank space at the bottom of the face; the groove across the front of the face is called the NICK—it serves as a guide in setting type right side up and as an identifying feature; the PIN MARK (which is found in large size type) may bear the type size or the foundry mark.

The WIDTH of type varies, as you can see from a comparison of the printed letters "i" and "w." But the HEIGHT of ALL type characters—that is, the distance from the foot to the top of the printing face—is always $^{11}\!/_{12}$ inch, or .918 inch. This is known as TYPE-HIGH, and is standard for ALL type and plates used on ordinary printing presses.

LINEAR MEASUREMENT

Because the point is such a small unit, it is not used to measure the length of lines of type or other long measurements. The PICA is the ordinary unit used for this purpose. The pica, you will remember, equals 1/6 of an inch. So to change the length (in inches) of any object to picas, you must MULTIPLY its inch measurement by 6. Or, to change the measure from picas to inches, you DIVIDE by 6. For example, a line of type which is 6 inches long is 36 picas long.

THE LINE GAGE

You'll find that the LINE GAGE is a handy and important tool to use in converting from inches to picas and vice versa—especially if you get a good one. There are several types in use, but the most helpful is marked in inches on one side and in picas on the other. Using this rule is even easier than multiplying or dividing by six, because you can simply measure your dimensions either way you wish. Most line gages are 12 inches (or 72 picas) long, and they are made of either wood or metal.

FITTING COPY TO SPACE

To find the number of words which will fit in a given amount of space, you can set one line of type to the established length of line—and in the size of type—desired. From this you can tell approximately how many words there will be in each line. If the words are unusually long or short, divide the number of letters in the line by 5; that will give you the average number of average-size words in the line.

Then you multiply the VERTICAL length (in inches) of the space by 72. That gives you the length of the space, in POINTS. If the lines are to be leaded, add the thickness of the leads to the size of the type; then divide the number of points in the length of the space by the size of type PLUS leads. That will give you the NUMBER OF LINES that can be set in the space. Now, multiply the number of words per line by the number of lines; the result will be THE NUMBER OF WORDS THAT WILL FIT IN THE GIVEN SPACE.

AN EXAMPLE

If that sounds pretty complicated, take an actual example and you'll see how easy it is to work out. Suppose you have a space 24 PICAS wide and 8 INCHES long, and you want to find out how many words you could set in this space—using 10-point type, with 2-point leads between each line.

WORDS TO LINE—You find an average of 11 words to the line.

LENGTH OF SPACE.—The length, 8 inches, multiplied by 72, equals 576 points.

DEPTH OF EACH LINE.—10 point type, plus 2 point leads, equals 12 points.

NUMBER OF LINES.—Divide 576 by 12 and you get 48 lines.

NUMBER OF WORDS.—48 multiplied by 11 equals 528 words, the number that will fit in the space.

FITTING SPACE TO COPY

Just the opposite of this procedure is involved in finding out how much SPACE a given number of WORDS will occupy. First find the number of words PER LINE; then divide the TOTAL number of words by the number of words per line to find the number of LINES necessary. Multiply the result by the size of type to be used, and divide by 72 points to find the length in inches.

An actual example will help make this clearer. Suppose you want to find out how much space will be occupied by 1,200 words set in 8-point type with lines 24 picas long.

WORDS TO LINE.—You find an average of 12 words per line.

NUMBER OF LINES.—1,200 words divided by 12 words per line equals 100 lines.

NUMBER OF POINTS.—100 lines multiplied by 8 points equals 800 points.

LENGTH OF SPACE.—800 divided by 72 equals 11.1 inches—the length of space that will be occupied.

WORDS PER SQUARE INCH

Another method of figuring the number of words which will fit in a given space or the size of space a given number of words will occupy, is known as the WORD-COUNT METHOD. This method is not so accurate as the two described previously, but it is faster and easier. When exact copy figuring is not necessary, this method will do very well. It is based on the words per square inch table given here.

As an example of the use of this table, take the same figures given in the previous section when you were finding the number of words that would fit in a given space. There the problem was to find how many words—set in 10 point type, leaded 2 points—would fit in a space 24 picas wide and 8 inches long.

APPROXIMATE NUMBER OF WORDS TO THE SQUARE INCH

Size of Type	Words to the Square Inch
6 point, solid	47
6 point, 2 point leaded	34
8 point, solid	32
8 point, 2 point leaded	23
10 point, solid	21
10 point, 2 point leaded	16
12 point, solid	14
12 point, 2 point leaded	11
14 point, solid	11
14 point, 2 point leaded	7
18 point, solid	7
18 point, 2 point leaded	5

From the table you will see that 10 point, 2 point leaded type fits approximately 16 words to the square inch. Your space is 4 inches (24 picas) wide and 8 inches long, so that is a total of 32 square inches; 32 multiplied by 16 gives you 512 words as the approximate number that will fit in the space. Figuring it the more accurate way described before, you got 528 words. But 512, the result we get by the word-count method, is close enough for most purposes.

This table can also be applied to find the amount of space a given amount of copy will require. For example, if you have 750 words to be set in 10 point solid, you would DIVIDE 750 by 21 (the number of words to the square inch for this size) and find that this amount of copy would require approximately 36 square iches. So you can set it 9 × 4, or 6 × 6 inches, or in any other combination of width and depth which will make up the 36 square inches.

CHARACTER COUNT

The easiest ACCURATE copy-fitting method is CHARACTER COUNT. This method is based on the comparison between the width of TYPEWRITER characters and

that of TYPE characters. Thus, it is a simple matter to find out how many characters there are in a typewritten line, and it is equally easy to count the number of characters in a line of type set in the size you want to use. Then, by a simple mathematical formula, you can transpose the two and find out how many lines you will need. Here's how.

Suppose you had a typewritten page containing 22 lines, with each line averaging 70 characters (including spaces between words). You wanted to set it in 12 point, in lines 22 picas wide. You find that, in this measure, there are 47 characters to the line. First you multiply 22 lines by 70 characters, and you get 1,540 typed characters on the page. Then you divide 1,540 by 47, to get 33 lines of type.

You can also base your figures on the number of characters to the inch, if it seems easier. Thus, there are 10 PICA typewritten characters to the inch or 12 ELITE characters. After finding out the number of typed characters in your copy, the procedure for finding out how many lines of type you will need is the same as that described above.

There are other methods of copy fitting, but the ones described here are probably the most used and the most efficient. It's good to be familiar with them all—but you can use whichever one you find easiest.

STOCK FIGURING

Figuring paper stock—to estimate how much is required before printing—is an interesting and relatively simple job. It is important too, because carelessness or improper figuring may result in waste and additional unnecessary expense.

CUTTING FROM A STOCK SHEET

When you sit down to figure out a job of paper cutting, your first step is to determine the number of sheets (of the size desired) that may be cut from a

stock sheet. The idea, of course, is to obtain as many sheets as possible with the smallest amount of waste.

If it's simply a problem of cutting a stock sheet in half or in quarters, you'll have no trouble at all. For example, if you want to get 8½ × 11 inch letterheads from a 17 × 22 inch sheet, you cut the sheet in half—first one way and then the other—and you have the exact size. But, frequently, it's not quite so simple as that.

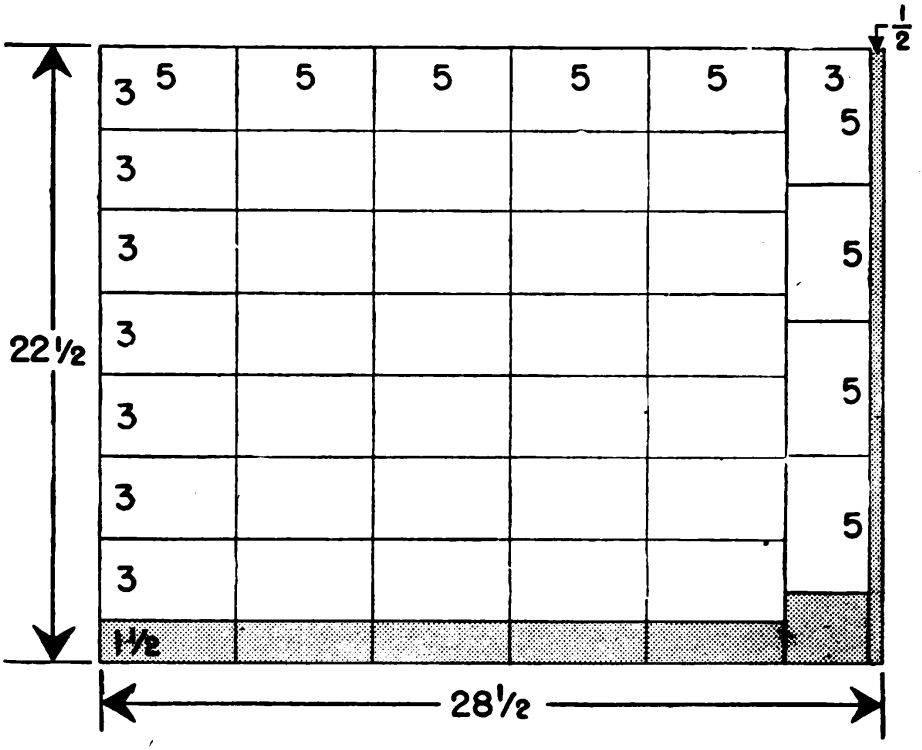
Here's an average problem, similar to those you will be running across practically every day. Suppose you had to cut 3 × 5 inch sheets from a 22½ × 28½ inch stock sheet. You'd try it both ways, that is cutting the 3 inch side from both the 22½ and the 28½ inch dimension—and also the 5 inch from both. Here's the way to do it:

$$\begin{array}{r} 3 \times 5 \\ 22\tfrac{1}{2} \times 28\tfrac{1}{2} \\ \hline 7 \times 5 = 35 \end{array} \qquad \begin{array}{r} 5 \times 3 \\ 22\tfrac{1}{2} \times 28\tfrac{1}{2} \\ \hline 4 \times 9 = 36 \end{array}$$

In the first case, seven three-inch cuts can be made from the 22½ inch dimension, and five five-inch cuts can be made from the 28½ inch dimension. In the second case, four five-inch cuts can be made from the 22½ inch dimension, and nine three-inch cuts from the 28½ inch dimension, giving you 36 sheets. So, APPARENTLY, you'd get more sheets by cutting the second way.

But ACTUALLY, the FIGURES ARE TRICKY. The process is not completed yet because you still must take into consideration the TRIM. In both cases, you have something LEFT OVER after you make the cuts described above. In the first case your trim figures out to 1½ inches on one side and 3½ inches on the other. In the second case it is 2½ inches on one side and 1½ inches on the other. Suppose you make a diagram (see figure 61) and see what comes out—

You'll notice that the trim in the second case is



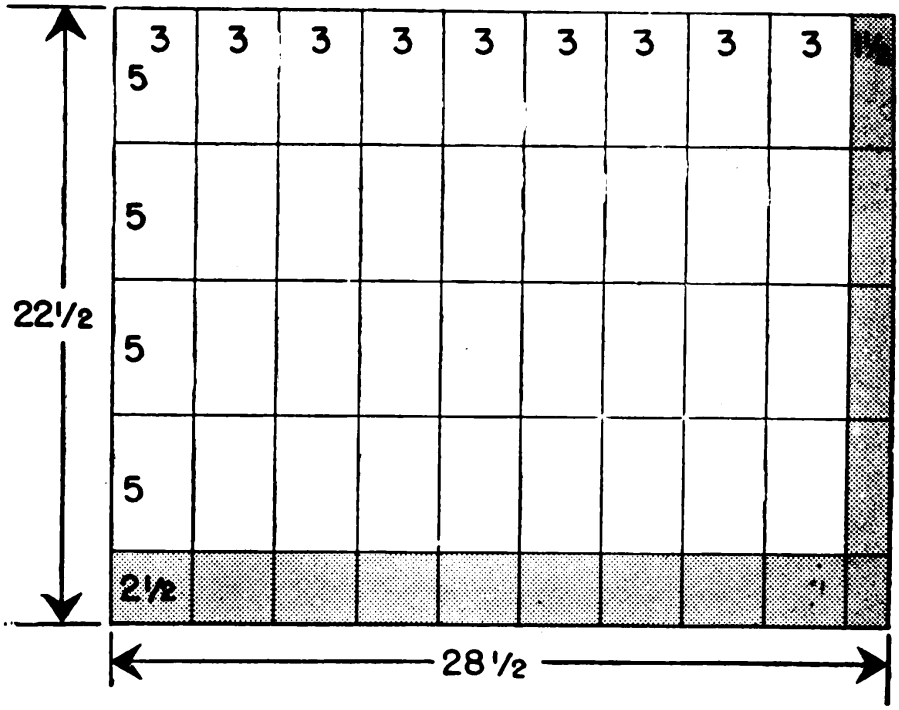


Figure 61.—3 × 5 sheets cut from 22½ × 28½ stock.

useless, but in the first case it can be used to make four EXTRA sheets of the desired size. You can add these four sheets to the 35 you have already cut, and that gives you 39 sheets compared to 36 in the second case. Incidentally, this type of cut is known as a "CROSS CUT."

After you have been figuring paper stock for a while you'll recognize right away the difference between useful trims and useless trims. But until you're sure of yourself, it will be a good idea to MAKE A ROUGH DIAGRAM of the stock sheet to help you figure your cut both ways. And you'll find that even experienced printers ALWAYS calculate the cut both ways, even if they don't need to make the diagram.

FIGURING STOCK SHEETS REQUIRED

After you have figured the number of sheets that can be cut from a single stock sheet, the next step is to find out how many stock sheets you need to print the job. That's a simple enough matter. Just divide the total number of finished sheets required by the number of sheets that can be cut from a stock sheet. For example, suppose the job calls for 15,000 finished sheets, size 3 × 5 inches. As you have just seen, you can cut 39 sheets from a 22½ × 28½ inch stock sheet, so you DIVIDE 15,000 by 39. That would show that you need 385 sheets—to which you should add a few sheets as allowance for spoilage. In the case of short runs (500 or less) it is customary to allow as much as 10 percent for spoilage; but in larger runs (10,000 or 15,000) this percentage can be reduced to three percent or four percent.

How Well Do You Know The Duties Of—

PRINTER 3c & 2c

QUIZ

CHAPTER 1

IMPROVEMENTS IN PRINTING

1. Where is printing said to have originated?
2. Why is Gutenberg remembered for his work in printing?
3. Who did the first printing in the English language in America?
4. On what principle did early presses operate?
5. Name the three types of printing, and describe the basis of each briefly.
6. What are the four main jobs in the print shop?

CHAPTER 2

PUNCTUATION FOR PRINTERS

Punctuate the following sentences:

1. was it john paul jones who said dont give up the ship
2. the famous report sighted sub sank same has become a classic of the sea
3. the captain of the destroyer came from boston mass and had been awarded the navy cross
4. could you call a printer 3c a seagoing printer
5. Punctuate the following paragraph from Patrick Henry's famous address:

   it is in vain sir to extenuate the matter Gentlemen may cry peace peace but there is no peace The war is actually begun The next gale that sweeps from the north will bring to our ears the clash of resounding arms Our brethren are already in the field Why stand we here idle What is it that gentlemen wish What would they have Is life so dear or peace so sweet as to be purchased at the price of chains and slavery Forbid it almighty god I know not what course others may take but as for me give me liberty or give me death

CHAPTER 3

MEET THE TYPE FAMILIES

1. Name the six main classes of type.
2. Tell what class of type each of the following is:
   a. **What is this line?**
   b. *What is this line?*
   c. *What is this line?*
3. Which of the following is Oldstyle Roman and which is Modern Roman?
   a. **What is this line?**
   b. What is this line?
4. On what kind of stock should Oldstyle Roman be printed? Modern Roman?
5. Give two differences between Oldstyle and Modern Roman.
6. What type is considered the most readable in small sizes?
7. Why is Script or Cursive type difficult to use?
8. Name two methods of emphasizing certain words or phrases.
9. What are the two kinds of borders?

CHAPTER 4

THE COMPOSING ROOM

1. What are the two most commonly used type cases and what is the chief difference between them?
2. Are the capital letters arranged alphabetically in the type case? How are the small letters arranged?
3. Draw a California job case.
4. What are ligatures?
5. How would you hold a composing stick?
6. Which is wider—an em quad or an en quad? A 3-em quad or a 3-em space?
7. What is the difference between letter spacing and justification?
8. What is "pi"?

9. What is a "live form"? A "dead form"? "Solid matter"?
10. How do nicks help in type distribution?

CHAPTER 5

PROOFING AND PROOFREADING

1. What is an office proof? A galley proof?
2. Which is preferable, the planer method or the proof-press method of taking proofs? Why?
3. Why must type forms be cleaned immediately after taking proofs?
4. Should corrections involving justification be made while the type is in the galley?
5. How would you indicate the following terms on a proof?
   a. Insert hyphen.
   b. Delete.
   c. No paragraph.
   d. Line up vertically.
   e. Italics.
6. Insert the proper proofreader's marks wherever they are necessary in this selection from Lincoln's Gettysburg Address:

   Fourscore and Seven years ago our fathers brought fourth upon this continent a nwe nation, conceived in liberty, and dedicated, to the proposition that all men are created equal equal. Now we are engaged in a great civil war, testing whether nation that, or any nation so conceived so dedicated, can long endure. We are met on a great battlefield of that ware. We have come to dedicate a portion of that field as a final resting-place for those who gave here their lives that that nation might live. it is altogetherher fitting and proper that we should do this and more But in a larger sense we cannot dedicate, we cannot consecrat we cannot hallow this ground. the brave men, living and or dead who struggled here, hve consecrated it far above our poor power to add or detract.

7. What do the following proofreader's marks mean?
   a. Stet.
   b. Tr.
   c. Rom.
   d. w.f.
   e. l.c.

CHAPTER 6

THE STONEMAN

1. Name three qualifications of an imposing stone?
2. Why should you discard wood furniture as soon as it starts to warp?
3. What are quoins? Reglets?
4. What should you do before you even put the form in the chase?
5. What is the usual position of the form in the chase?
6. Where do you put the quoins in the chase?
7. Why should you tighten all quoins evenly?
8. What are the three methods of multiple lock-up? How do they differ?

CHAPTER 7

MAINTENANCE OF THE PRINTING PRESS

1. What are the three kinds of printing presses and what is the basic principle of each?
2. What is the job of the platen on a platen press?
3. How is the chase held on the bed of the press?
4. What prevents the paper from sticking to the type?
5. When the throw-off lever is pushed forward will you get an impression?
6. How often should a press be oiled if it is run continuously?
7. Describe briefly how you would clean the rollers on a press.
8. What would you do if you had been using black ink and you wanted to run light green ink on the same press?

9. Why must you use rollers cast for the time of year when you will be using them?

CHAPTER 8

OPERATION OF THE PLATEN PRESS

1. Describe briefly the process of inking the press by hand.
2. Why must you make sure the bed of the press is perfectly smooth before you insert the chase?
3. What is make-ready? A tympan? Squeeze?
4. What is the usual position for the gage pins?
5. What is the difference between overlaying and underlaying?
6. Why is it necessary to clean the tympan after completing your make-ready?
7. Where is the feed board? The delivery board?
8. If you insert a sheet incorrectly in the press, should you try to straighten it out before it hits the type form?
9. What two jobs does your left hand do in operating a platen press?

CHAPTER 9

THE PAPER PICTURE

1. What are the three main types of paper—classified as to content?
2. In the paper making process, what does the chipper do? The digester? The refining engine?
3. What are the six chief types of paper—classified as to use?
4. What is the paper most commonly used in the print shop?
5. What type of paper would you use:
   a. For letter heads?
   b. For a high-class circular?
   c. For an inexpensive ship's newspaper?
6. What kind of paper is used in this book?
7. What does this description of a paper stock mean—"28×44—60"?

CHAPTER 10

PAPER HANDLING IN THE PRINT SHOP

1. Give three "musts" in putting paper on the cutter table.
2. Name three types of folds.
3. For what purpose is a bone folder used? What is a signature?
4. *a.* Name three methods of binding.
   b. Which would you use on a small booklet?
   c. Which would you use on a heavy, thick catalog?
5. Name three other bindery jobs and describe each briefly.

CHAPTER 11

MATHEMATICS FOR THE PRINTER

1. What is the name of the system used to measure type and what is the size of its basic unit?
2. What is the size of the type used in the following lines:
   a. What size is this?
   b. What size is this?
   c. What size is this?
3. How are lines of type measured? How many of these units are there to an inch?
4. *a.* By using the most accurate method of fitting copy to space, find out how many words, set in 10 point, 2 point leaded, will fit in a space 36 picas wide and 10 inches long. There are an average of 16 words to the line.
   b. By using the word-count method and the table on page 127, figure how many words would fit in the same space.
5. How much space would you need for 750 words set in 8 point type, solid, in lines 18 picas long? Say there are an average of 9 words per line.
6. If you had to cut 5 × 9 sheets from a 35 × 45 stock sheet, would you cut the 5 inch side from the 35 inch or the 45 inch side?
7. If a job called for 2,500 letterheads, 8½ × 11, which would cut 4 from a stock sheet 17× 22, how many sheets of stock would you order?

ANSWERS TO QUIZ

CHAPTER 1

IMPROVEMENTS IN PRINTING

1. The Chinese are thought to have been the first people to use printing.
2. He was the first to invent an adjustable mold for the manufacture of movable type. This was the first major step in the development of the kind of printing we know today.
3. Stephen Daye and his two sons, on a press brought to Massachusetts by the Rev. Jose Glover.
4. The screw principle which later gave way to the lever principle.
5. (*a*) Letterpress or relief printing—in which raised type comes in contact with paper and stamps an impression on it.
   (*b*) Planographic printing—which uses an ink repellent to block out spaces in which no impression is wanted.
   (*c*) Intaglio printing—which involves areas etched below the surface which are filled with ink to give an impression to the paper.
6. (*a*) Composition—the selection and setting of type.
   (*b*) Stoneman—imposition of the form in the chase and lock-up of the form.
   (*c*) Presswork—the actual printing of the job.
   (*d*) Bindery—folding, collating, cutting, binding, etc.

CHAPTER 2

PUNCTUATION FOR PRINTERS

1. Was it John Paul Jones who said, "Don't give up the ship"?
2. The famous report, "Sighted sub, sank same," has become a classic of the sea.
3. The captain of the destroyer came from Boston, Mass., and had been awarded the Navy Cross.

4. Could you call a Printer 3c a "seagoing printer"?
5. It is in vain, Sir, to extenuate the matter. Gentlemen may cry, "Peace; Peace!"—but there is no peace. The war is actually begun! The next gale that sweeps from the north will bring to our ears the clash of resounding arms! Our brethren are already in the field! Why stand we here idle? What is it that gentlemen wish? What would they have? Is life so dear, or peace so sweet, as to be purchased at the price of chains and slavery? Forbid it, Almighty God! I know not what course others may take; but as for me, give me liberty or give me death!

CHAPTER 3

MEET THE TYPE FAMILIES

1. Roman, Italic, Sans-Serif, Text, Script, and Contemporary.
2. (*a*) Roman. (*b*) Italic. (*c*) Script.
3. (*a*) Modern. (*b*) Oldstyle.
4. Oldstyle should be printed on soft paper; Modern on a smooth, glossy stock.
5. Oldstyle is a softer type and its strokes are more nearly uniform than Modern. The serifs on Oldstyle are rounded; in Modern they are straight.
6. Roman.
7. The connecting links are easily broken off, so great care must be taken when setting script type.
8. Italics or small caps.
9. Unit cast or strip borders.

CHAPTER 4

THE COMPOSING ROOM

1. News case and California job case. The news case consists of two separate cases—one for capital letters and one for lower case letters. In the California job case, the upper and lower case letters are in the same case.

2. No. The capital letters "J" and "U" are at the end of the sequence in both the news case and the California job case. Small letters are arranged by frequency of use.
3. Compare your sketch with figure 23.
4. Ligatures are double or triple letters, like "ff" or "ffl", and are used to save time and space.
5. The composing stick should be held in your left hand with your fingers below and your thumb over the stick. It should be held at an angle so the characters won't fall out and with the open end of the stick away from you.
6. An em quad is twice as wide as an en quad. A 3-em quad is three times the width of an em quad, and a 3-em space is one-third the width of an em quad.
7. Letter spacing is spacing between letters; justification is spacing between words.
8. "Pi" is scrambled type.
9. A "live form" is one that is going to be used. A "dead form" is one that has been used and is ready for distribution. Solid matter is type set without any spacing between the lines.
10. The nicks are in the same place in all type characters of the same kind, so they will help you tell which type is which for easier distribution.

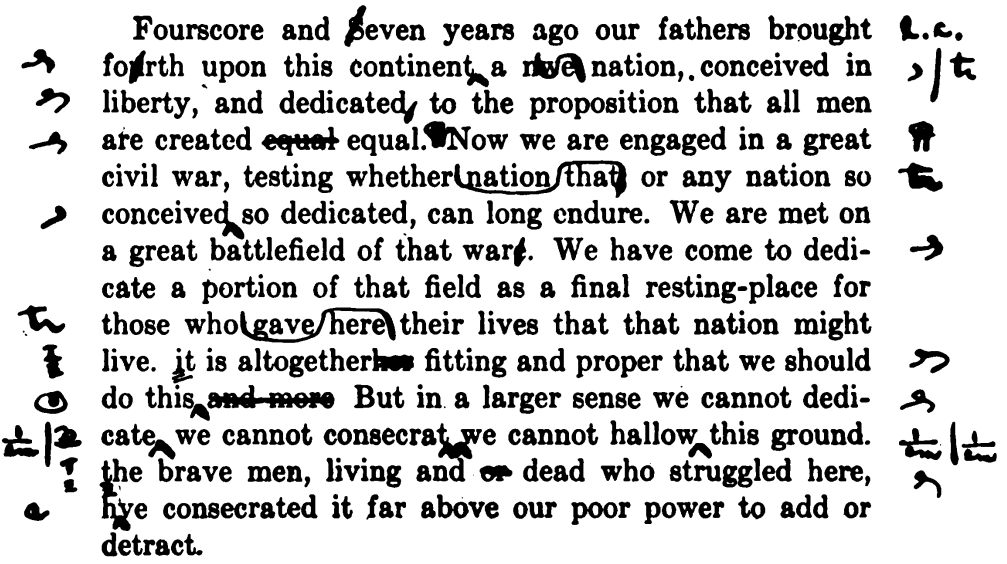
CHAPTER 5

PROOFING AND PROOFREADING

1. An office proof is the first proof pulled and is for use in the shop only. A galley proof is a proof which is set in one continuous form and is not divided into pages.
2. The proof-press method of taking proofs is preferable to the planer method because it results in a clearer, easier-to-read proof.
3. The ink will harden, will fill in the letters and will be difficult to remove.
4. No. If corrections involve justification, the type should be returned to the composing stick where it will be easier to make accurate changes.

5. Check your answer with the proofreader's marks shown on pages 61, 62, 63.

6.



Fourscore and seven years ago our fathers brought forth upon this continent a new nation, conceived in liberty, and dedicated to the proposition that all men are created ~~equal~~ equal. Now we are engaged in a great civil war, testing whether nation that or any nation so conceived so dedicated, can long endure. We are met on a great battlefield of that war. We have come to dedicate a portion of that field as a final resting-place for those who gave here their lives that that nation might live. it is altogether ~~her~~ fitting and proper that we should do this ~~and more~~ But in a larger sense we cannot dedicate we cannot consecrat we cannot hallow this ground. the brave men, living and ~~or~~ dead who struggled here, hve consecrated it far above our poor power to add or detract.

7. (*a*) Leave as is.
   (*b*) Transpose.
   (*c*) Roman letters.
   (*d*) Wrong font.
   (*e*) Lower case.

CHAPTER 6

THE STONEMAN

1. An imposing stone should be perfectly smooth, large enough to handle whatever size forms will fit on your press, and be 38½ inches high.
2. Warped wood furniture may cause the type to loosen while the form is on the press and result in a break-up of your whole type form.
3. Quoins are metal wedge-shaped devices used to lock the type in the chase. Reglets are narrow strips of wood used with quoins in lock-up and as furniture.
4. Study the job carefully. Be sure you know all the details of how the job is to be printed before you put the form in the chase.

5. The usual position of the form in the chase is such that the sheet will be in the center from left to right and slightly above center from top to bottom.
6. Quoins are usually put at the top and right of the chase.
7. Each quoin should be tightened a little at a time, so the pressure will be equally distributed among all the quoins.
8. Two-up method, which consists of two duplicate forms side by side. Work-and-turn method—front and back forms side by side. Sheetwise method—two or more different forms side by side.

CHAPTER 7

MAINTENANCE OF THE PRINTING PRESS

1. The Platen press, which operates on the principle of two flat surfaces coming together to create the impression. The Cylinder press in which one printing surface is curved and the other is flat. The Rotary press in which both printing surfaces are curved.
2. The platen holds the paper as it swings forward to meet the type form.
3. By lugs at the bottom and a clamp at the top.
4. The grippers which extend between the platen and the type form.
5. No. When the throw-off lever is forward, the back part of the press is pushed back and you will not get an impression.
6. Twice a day, if run continuously.
7. Roll them one by one to the top of the bed, then rub each roller—starting with the bottom roller—lengthwise with a cloth on which you've put a mixture of kerosene and gasoline. Then move the roller down and repeat the process with the other rollers.
8. Clean the disk in the regular way, then put the light green ink on it, run the press a few minutes, then clean again.
9. Rollers cast in each season of the year contain the correct amount of glycerin for use in that season. If used in the wrong season, they will be either too hard or too soft.

CHAPTER 8

OPERATION OF THE PLATEN PRESS

1. The ink is applied with a spatula at the upper left-hand side of the disk.
2. If there is dirt or any projection on the bed of the press, the form won't be smooth and you'll get an uneven impression.
3. Make-ready is the process of equalizing the impression before printing. Tympan is the name given to the layers of paper which form a pad under the impression. Squeeze is the thickness of the packing.
4. One gage pin is usually at the left side and two at the bottom.
5. Overlaying is done under the drawsheet and underlaying is done on the back of the type form.
6. If the tympan is not clean, that is, if an impression has been made on it by the type form, this impression will be reproduced on the backs of the first few sheets you feed into the press.
7. The feed board is at the right of the press. The delivery board is directly in front of you when you are standing in the correct position at the press.
8. No. Never attempt to straighten a sheet after it has once been inserted in the press. Use the throw-off lever to prevent an impression.
9. Your left hand operates the throw-off lever and also removes the sheets from the press.

CHAPTER 9

THE PAPER PICTURE

1. Wood pulp, rag, and rag content.
2. The chipper cuts the logs into small pieces to prepare them for the later processes in paper making. In the digester the wood chips are cooked in acid and water until they become wood pulp. The refining engine mashes the pulp until it reaches a smooth consistency.

3. Newsprint, book paper, writing paper, cardboards, cover stock and miscellaneous papers.
4. Book paper.
5. (*a*) Writing paper.
   (*b*) A coated or enameled book paper.
   (*c*) Newsprint or a machine-finish book paper.
6. 90-pound machine coated book.
7. 1,000 sheets of the stock in sheet size 28 × 44 inches weigh 60 pounds.

CHAPTER 10

PAPER HANDLING IN THE PRINT SHOP

1. (*a*) Jog the paper evenly on all sides.
   (*b*) Push the paper back until it is snug against the back gage.
   (*c*) Put a sheet of cardboard on the top and bottom of the pile.
2. (*a*) Single fold.
   (*b*) French fold.
   (*c*) Accordion fold.
3. A bone folder is used to make a hand fold in ordinary paper stock. A signature is a single sheet on which a number of pages are printed.
4. (*a*) Stapling, wire stitching, tying with cord.
   (*b*) Stapling or wire stitching.
   (*c*) Tying with cord.
5. Padding—the process of making pads or tablets by cementing the edges of sheets of paper. Punching—the process of punching holes in the paper by hand- or foot-power punches or by paper drills. Perforating—the process of punching tiny holes or slits in paper, so a part of the sheet can be torn off easily.

CHAPTER 11

MATHEMATICS FOR THE PRINTER

1. The point system. The point is $\frac{1}{72}$ inch wide.
2. (*a*) 6 point.
   (*b*) 12 point.
   (*c*) 10 point.
3. Lines of type are measured in picas and there are 6 picas to the inch.
4. (*a*) 16 words to the line. Length, 10 inches, multiplied by 72 points = 720 points. 10 point type, plus 2 point leads = 12 points. 720 divided by 12 = 60 lines. 60 multiplied by 16 = 960 words which will fit in the space.
   (*b*) The space is 36 picas or 6 inches wide and 10 inches long, or 60 square inches; 10 point type, 2 point leaded, goes 16 words to the square inch according to the table. So 60 multiplied by 16 equals 960 words which will fit in the space.
5. There are an average of 9 words to the line. 750 words divided by 9 equals 84 lines. 84 lines multiplied by 8 points equals 672 points. 672 divided by 72 equals 9.4 inches—the length of the space.
6. 5×9 $\quad$ 9×5
   35×45 $\quad$ 35×45
   $7 \times 5 = 35$ $\quad$ $3 \times 9 = 27$

   You would cut the 5-inch width from the 35-inch side and the 9-inch length from the 45-inch side.
7. 2,500 sheets divided by 4 equals 625 sheets. You would probably add about 25 stock sheets for spoilage and order 650 sheets for this job.

QUALIFICATIONS FOR PRINTER 3c

(A) PRACTICAL FACTORS.

(*a*) COPY PREPARATION.—Demonstrate ability to read copy and to interpret proofreader's marks.

(*b*) COMPOSITION.—Demonstrate ability to hand set and distribute type, read galley proofs, and make corrections on proof.

(*c*) PRESSWORK.—Demonstrate ability to operate a hand-feed jobber.

(d) BINDERY.—Demonstrate ability to perform all hand operations in the bindery, such as trimming, collating, punching, and stitching.

(*e*) PAPER.—Demonstrate ability to distinguish between paper types and grades.

(*f*) MAINTENANCE.—Demonstrate ability to lubricate and clean print-shop equipment.

(*g*) GENERAL QUALIFICATIONS REQUIRED OF ALL PETTY OFFICERS:

(1) LEADERSHIP.—Demonstrate ability to take charge of a group of men. Demonstrate ability to train subordinates.

(2) AUTHORITY AND RESPONSIBILITY.—Demonstrate a knowledge of the duties common to all petty officers ashore and afloat in regard to the exercise of authority and the responsibilities in connection with maintaining order and safeguarding government property.

(3) SECURITY.—Demonstrate a knowledge of importance of safeguarding classified information.

(4) DRILL.—Demonstrate ability to take charge of a group, and conduct infantry drill and physical exercises.

(5) DAMAGE CONTROL.—Demonstrate a knowledge of watertight integrity and material conditions.

(6) FIRST AID.—Demonstrate an elementary knowledge of first aid.

(7) ARITHMETIC.—Demonstrate a fundamental knowledge of elementary arithmetic including addition, subtraction, multiplication, division, simple and decimal fractions, and mensuration

(B) EXAMINATION SUBJECTS.

(*a*) TYPESETTING.—Describe the commonly used type faces and know the principles of hand typesetting.

(*b*) MAKE-UP.—Know the principles of locking forms and the fundamentals of make-up.

(*c*) SPELLING AND PUNCTUATION.—Thorough knowledge of spelling and punctuation.

(*d*) SAFETY PRECAUTIONS.—Know the safety precautions to be observed while working with and around print-shop machinery on board ship or at a shore station.

(*e*) PAPER HANDLING.—Knowledge of proper methods of paper handling, including paper cutting, stapling, punching, and folding.

(*f*) PROOFREADER'S MARKS.—Know the proofreader's marks commonly used in printing.

(*g*) FUNDAMENTAL KNOWLEDGE REQUIRED OF ALL MEN IN THE NAVY.—All men in the Navy shall be conversant with general naval subjects contained in the General Training Course for Non-Rated Men. Entries in service records that men concerned have completed a course and passed an examination in the General Training Course for Non-Rated Men may be accepted by the examining board in lieu of examination in these subjects when prescribed.

QUALIFICATIONS FOR PRINTER 2c

(A) PRACTICAL FACTORS.

(*a*) COPY PREPARATION.—Demonstrate ability to mark up copy for composition.

(*b*) COMPOSITION.—Demonstrate ability to make up single page forms, lock up, and impose them for a single-color press.

(*c*) PRESSWORK.—Demonstrate ability to operate a single-color mechanical-feed jobber.

(*d*) BINDERY.—Demonstrate ability to operate all machines in the bindery, such as trimmers, collators, punches, and stitchers.

(*e*) PAPER.—Demonstrate ability to cut paper economically from large sheets of stock.

(*f*) MAINTENANCE.—Demonstrate ability to lubricate, clean, and make simple repairs and adjustments to print-shop equipment.

(*g*) Review of practical factors required for third class.

(B) EXAMINATION SUBJECTS.

(*a*) MARKING COPY.—Know printer's proof marks and how to mark copy.

(*b*) PROOF.—Know how to read proof and make corrections.

(*c*) MAKE-UP.—Know the operations involved in the page imposition or make-up of a book or pamphlet.

(*d*) Review of examination subjects required for third class.

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